FEB 28 1922

The Journal of HEREDITY

A monthly publication devoted to Plant Breeding Animal Breeding and Eugenics

GENERAL LIBRARY
FEB 28 1922
UNIV. OF MICH.

WHAT IS THERE IN PHYSIOGNOMY?
PRODUCTIVE AND UNPRODUCTIVE APPLE TREES
IMMIGRATION AND THE RESTRICTIVE LAW
NATIVE HOME OF THE CHERIMOYA
THE PEACH-ALMOND HYBRID
GROWTH OF CALVES

PUBLISHED MONTHLY AT MENASHA, WISCONSIN
BY THE
AMERICAN GENETIC ASSOCIATION
EDITORIAL AND GENERAL OFFICES
WASHINGTON, D. C.

Volume XII, Number 7 August-September, 1921
(Combined issues in this and previous number only)

The American Genetic Association

An incorporated organization devoted to promoting a knowledge of the laws of heredity and their application to the improvement of plants, animals, and human racial stocks.

Its membership is composed of men of science, teachers, publicists, physicians, clergymen, parents, students, horticulturists, and breeders of live stock throughout the world.

The Association owns the JOURNAL OF HEREDITY, which is published monthly and sent to each member without additional cost. Every member is thus a part owner of the JOURNAL.

Membership imposes no burdensome obligations. The Association, which is cooperative in nature, welcomes assistance in research, but does not demand it. Members are invited to submit discussions of the results of their research, accompanied by new and unusual photographs. All papers received will be given full consideration by the editorial board.

Hundreds of members are engaged in collecting facts about inheritance, and making experiments to determine the laws of heredity. Their discoveries are of fascinating interest and far-reaching importance to the city dweller and the country dweller alike. These findings are being reported and discussed every month in the JOURNAL, and in no better way can serious minded people keep abreast of one of the greatest movements of modern science.

REQUIREMENTS FOR MEMBERSHIP

Subject to the approval of the Council, any person interested in the improvement of the human race or the creation of better varieties of plants and animals, is eligible for membership.

The Association welcomes all who are interested in its program, and the Secretary will be glad to answer any inquiries.

Annual dues, giving the right to attend all meetings, and receive the JOURNAL OF HEREDITY, are $3 within the United States and its possessions; $3.25 in Canada, and $3.50 in all other foreign countries; life membership, $50.

If you are not already a member, and want to become one, or if you know of anyone who you think is interested in membership, write to

THE AMERICAN GENETIC ASSOCIATION

Menasha, Wisconsin

Editorial and General Offices, Box 354, Pennsylvania Ave. Sta., Washington, D. C.

The

Journal of Heredity

(Formerly the American Breeders' Magazine)

VOL. XII, NO. 7 AUGUST-SEPTEMBER, 1921

CONTENTS

PRODUCTIVE AND UNPRODUCTIVE TYPES OF TREES, ... KARL SAX AND JOHN W. GOWEN 291
MANUAL OF PSYCHIATRY (Review) 300
WHAT IS THERE IN PHYSIOGNOMY? ..... FREDERICK ADAMS WOODS 301
THE EUGENIC PROSPECT (Review) 318
IMMIGRATION AND THE THREE PER CENT RESTRICTIVE LAW ..... ROBERT DE C. WARD 319
GROWTH OF CALVES ..... J. J. HOOPER 327
THE "PEACH-ALMOND" HYBRID ..... LEONARD COATES 328
THE NATIVE HOME OF THE CHERIMOYA ..... WILSON POPENOE 331
TUBERCULOSIS AND HOW TO COMBAT IT (Review) 336
CHILDREN BY CHANCE OR BY CHOICE (Review) 336

The JOURNAL OF HEREDITY is published monthly by the
AMERICAN GENETIC ASSOCIATION
Publication office, 450 Ahnaip Street, Menasha, Wis.
Editorial and general offices, Washington, D. C.

The JOURNAL OF HEREDITY is published by the American Genetic Association for the benefit of its members. Canadian members who desire to receive it should send 25 cents a year, in addition to their regular membership dues of $3.00, because of additional postage on the magazine; foreign members pay 50 cents extra for the same reason. Subscription price to non-members, $3.00 a year, foreign postage extra; price of single copies, 35 cents.

Entered as second-class matter May 13, 1921, at the postoffice at Menasha, Wisconsin. Acceptance for mailing at the special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized Dec. 20, 1918. **Contents copyrighted 1921 by the American Genetic Association. Reproduction of articles or parts of articles permitted only upon request, for a proper purpose, and provided due credit is given to author and to the JOURNAL OF HEREDITY** (Organ of the American Genetic Association, Washington, D. C.), Menasha, Wisconsin. Address all communications to the Association's office at Washington, D. C.

Date of issue of this number, February 20, 1922.

ORCHARD OF BEN DAVIS APPLES AT THE MAINE AGRICULTURAL EXPERIMENT STATION

Studies made in this orchard of 881 trees show that productiveness is correlated with type of growth, the most productive trees being large, open and spreading in habit, with short laterals and many spurs, while the unproductive ones are small and upright, with slender branches and few spurs. The tree in the left foreground, which is of the latter type, bore an average of 46 lbs. of fruit per year, while that in the right foreground yielded an average of 226 lbs. per year during the same five-year period. While differences in soil conditions are probably responsible for a certain amount of variation in tree growth and productiveness, the authors believe that the type of root stocks used is also of great importance. They hold that there is no critical evidence to show that differences in productiveness within a clonal variety, such as the Ben Davis, are due to bud variation. (Frontispiece.)

PRODUCTIVE AND UNPRODUCTIVE TYPES OF APPLE TREES

STUDIES IN ORCHARD MANAGEMENT. IV.[1]

KARL SAX AND JOHN W. GOWEN
Maine Agricultural Experiment Station

IN AN apple orchard containing trees of the same age and variety it is usually possible to distinguish trees which have different habits of growth. The question naturally arises whether these differences in growth habit are correlated with differences in productivity. A study of the tree type and yield of fruit was, therefore, undertaken with 881 Ben Davis trees. The trees are of the same age—about 28 years—and during the period covered by this investigation were free from serious injury or disease. They were classified according to type or habit of growth, and annual records were kept of the yield and growth of each tree.

In the present paper will be considered the characteristics of the various types of trees, the relation between type and yield and type and circumference, and the factors which may cause the different tree types. In presenting these data the authors wish to express their indebtedness to, and appreciation of, the work of Dr. Frank M. Surface, under whose direction most of the data for this study were collected.

TYPES OF BEN DAVIS TREES

A study of variation in the habit and amount of growth of Ben Davis trees reveals two principle contrasting types, type 1 and type 3, and certain intermediate types intergrading between the two main types.

Type 1 is a large vigorous tree with an open head. The branches are large and often drooping; and many laterals are present with abundant spurs. (See Fig. 1.)

Type 3 is a rather small tree with small upright branches. Its branches are slender and have few laterals or spurs. (See Fig. 3.)

Between types 1 and 3 are a number of integrading types whose position in the series is determined by their resemblance to the types described above. Type 2 may be regarded the center around which are grouped the other types in the series. Type No. 2 is characterized by a vigorous growth, spreading head, stout numerous and drooping branches (Fig. 2). It differs from type 1 in that it has longer laterals and fewer spurs. Type 2 grades off to type 1 through types 2-1 and 1-2, the latter approaching type 1. Similarly, the distance between types 2 and 3 is bridged by type 2-3 and 3-2 the former approaching type 2, the latter type 3.

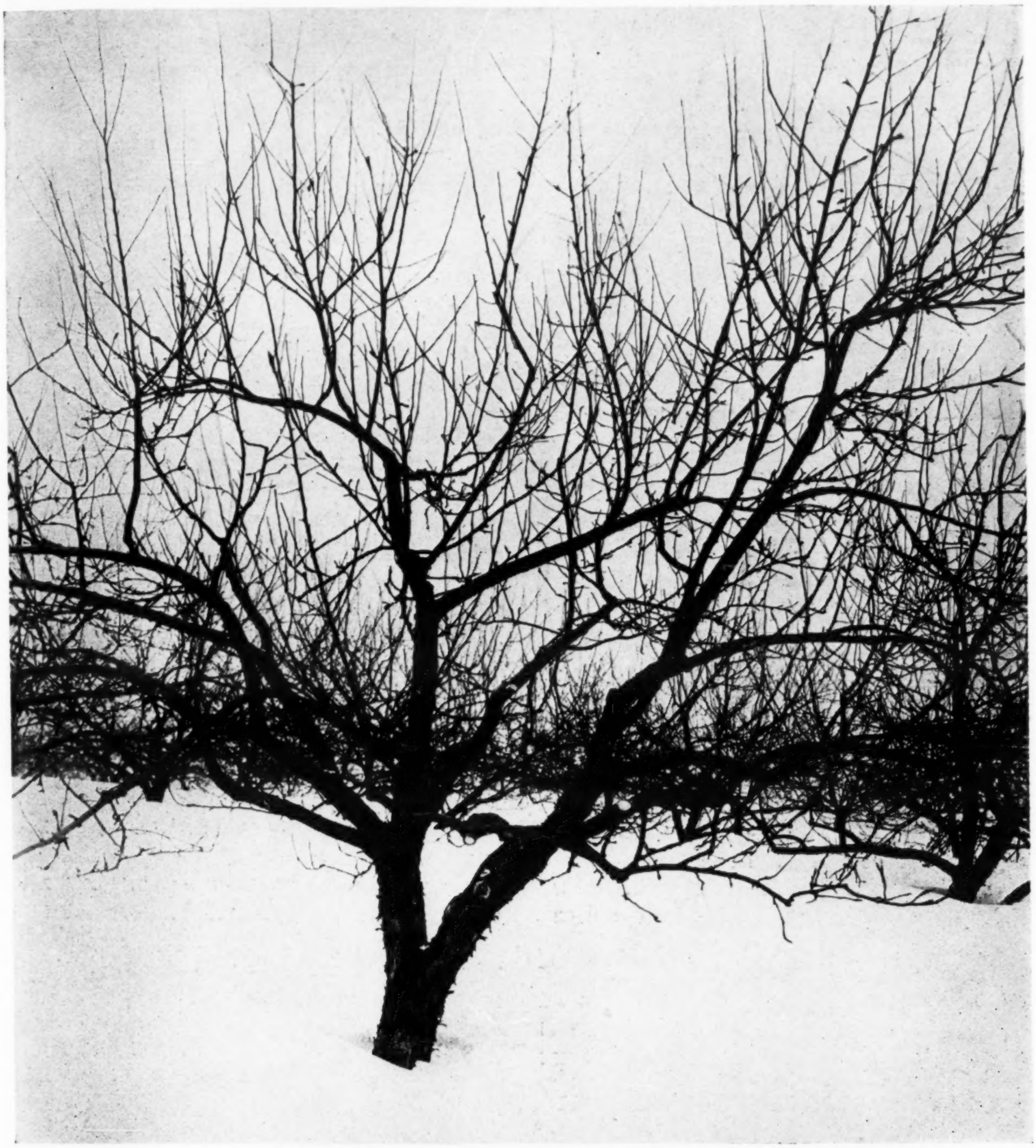
RELATION BETWEEN TYPE AND YIELD

In general, trees of type 1 are the most productive and the average productivity decreases for the intermediate types as they approach type 3. Type 3 is very unproductive, and even in the most favorable year the trees of this type bore an average of little more than one bushel of fruit per tree. The distribution of the yields of the various types together with the means and degrees of variability are shown in Table 1.

[1] Papers from the Biological Laboratory, Maine Agricultural Experiment Station No. 150.

PRODUCTIVE TYPE OF BEN DAVIS APPLE TREE

Large, open, spreading trees such as the one here shown have been found to be more productive than small, upright trees with slender branches and few spurs. In the studies made at the Maine Agricultural Experiment Station it was found that 121 trees of the type shown above (which is termed *type 1*) produced an average annual yield of 191 lbs. of fruit per tree during a five year period. The authors believe that the selection of large, vigorous root stocks will tend to produce trees of this type. (Fig. 1.)



A TREE OF INTERMEDIATE CHARACTER

Between the productive type of Ben Davis apple tree (type 1) and the unproductive one (type 3), the authors have found a large number of trees which must be considered as intermediate in character. These they have placed in a separate group, which they call type 2. During the five year period from 1914 to 1918, 233 trees of this type produced an average annual yield of 113 lbs. of fruit per tree. It may be mentioned that the classification of productive and unproductive trees into these three types is somewhat arbitrary, since there are numerous trees which do not properly fall within any one of the three groups, but are intermediate between two of them. The classification has, however, been found to serve a very practical purpose: unusual productiveness is shown to be correlated with a certain type of growth. (Fig. 2.)

In 1914, the most favorable year, the average yield of the 121 trees of type 1 was 283.7 pounds or more than 2 barrels per tree, while the average yield of the 136 trees of type 3 was only 40.1 pounds or less than a third of a barrel per tree. The 233 trees of type 2 averaged 190.3 pounds or nearly a barrel and a half per tree in 1914. Of the total number of trees

Table I: Average yields of the types of trees for 1914-18.
Mean Yields in lbs. of fruit.

Type	No. of trees	1914	1915	1916	1917	1918
1	121	283.72 ± 4.31	220.58 ± 3.82	178.43 ± 3.50	117.60 ± 2.71	151.82 ± 5.12
1-2	77	243.25 ± 4.67	185.58 ± 4.41	146.36 ± 4.15	87.92 ± 2.42	122.21 ± 5.87
2-1	131	228.01 ± 4.17	166.79 ± 2.71	127.10 ± 3.45	82.06 ± 2.45	85.57 ± 3.37
2	233	190.34 ± 3.13	137.55 ± 2.39	99.01 ± 2.55	70.00 ± 1.82	67.60 ± 2.79
2-3	101	139.70 ± 4.65	102.87 ± 3.20	75.54 ± 3.23	56.14 ± 2.43	64.85 ± 4.13
3-2	82	89.76 ± 4.67	78.54 ± 2.86	58.29 ± 2.97	45.12 ± 2.63	52.93 ± 4.04
3	136	40.15 ± 2.35	47.79 ± 2.11	41.03 ± 1.99	27.06 ± 1.37	40.44 ± 2.34
Total	881	175.20 ± 2.32	134.54 ± 1.67	102.62 ± 1.53	69.64 ± 1.05	81.09 ± 1.65

(881) more than one-third produced less than one barrel per tree, due largely to the presence of unproductive types of trees.

In the table given above it is evident that the trees of type 1 are the most productive and that the productivity decreases as the intermediate types approach type 3. It is possible to measure accurately the degree of correlation between tree type and yield by determining the correlation ratio. These measures of correlation are shown in Table II for the years 1914-18.

The correlation of .50 to .70 indicates that *tree type* is a reliable indication of the probable yield of the tree.

Table II: Ben Davis Apple Orchard. 881 trees.
Correlations between type, yield and circumference.

	Year	Correlation Coefficient	Correlation Ratio
Correlation between type and yield	1914		.77 ± .01
	1915		.74 ± .01
	1916		.64 ± .01
	1917		.58 ± .01
	1918		.49 ± .02
Correlation between type and circumference	1914		.72 ± .01
	1915		.69 ± .01
	1916		.66 ± .01
	1917		.67 ± .01
	1918		.66 ± .01
Correlation between circumference and yield	1914	.79 ± .01	.81 ± .01
	1915	.75 ± .01	.76 ± .01
	1916	.71 ± .01	.75 ± .01
	1917	.60 ± .01	.61 ± .01
	1918	.49 ± .02	.52 ± .02

In other words we would, in general, be justified in using tree type as a means of judging which trees are unproductive and unprofitable.

The correlation ratios between type of tree and circumference of trunk are also determined. The high degree of correlation (see Table II) between type and circumference indicates that type 1, or productive trees, are in general the largest trees, and that the type 3 or unproductive trees are as a rule small. These results indicate that yield is closely associated with the size as well as type of tree. The relation between circumference of trunk and yield is shown in Table II. Both the correlation coefficients and correlation ratios are high, indicating that yield also is closely correlated with size of tree. The question immediately arises: to what extent are the differences in yield of the various types due to differences in the size of the trees of each type? By determining the correlation between type and yield with the tree circumference held constant little or no correlation between type and

AN UNDESIRABLE TYPE OF BEN DAVIS APPLE TREE

In an orchard of 881 trees, there were 136 of this type, which has been called type 3. The average annual yield of these trees during a five year period was only 39 lbs. of fruit per tree, as opposed to 191 lbs. for trees of type 1, and 113 lbs. for trees of type 2. The unproductive trees are rather small, upright in habit, with slender branches and few spurs. (Fig. 3.)

yield of trees is found. From this it may be concluded that yield is, in general, dependent on the size of the tree and that differences in size of trees of the same age are closely associated with a rather definite type of growth.

THE CAUSE OF PRODUCTIVE AND UNPRODUCTIVE TYPES

Consistently unproductive trees have often been attributed to inherent differences resulting from bud mutation. In other words certain varieties are thought to contain high and low yielding strains of trees. There are however, a number of factors which may cause consistent differences in the productivity of trees in the same orchard. The following are the important known factors: 1. Soil heterogeneity, including such permanent differences as soil moisture, depth of soil, elevation, and physical and chemical

properties of the soil, which may cause certain trees to yield more than others from year to year. 2. The seedling root stocks used for apple trees are extremely variable in vigor and type of growth and may cause much variation in yield of trees. 3. Variability in buds or scions of a clonal variety may cause variability in the performance of individual trees. The various known factors which may cause differences in the productivity of trees of a clonal variety will be considered in the above order.

VARIABILITY IN PRODUCTIVITY, DUE TO SOIL HETEROGENEITY

If differences in productivity are due to variable root stocks or variable scions we would expect a random distribution of high and low yielding trees throughout the orchard. If soil variability is the cause of differences in performance we would expect to find the high and low yielding trees in rather definite groups. It is hardly possible that soil differences can be so local in extent as to effect the productivity of but a single tree. Frequently an unproductive tree will be found entirely surrounded by comparatively productive trees. We have dug up several of these trees and in every case the root system of the unproductive tree was so interwoven with the root systems of the productive trees that they had to a great extent a common feeding ground. In no case was the isolated unproductive tree in apparently poorer soil than the productive trees. From this it seems apparent that the isolated unproductive tree cannot be due primarily to unfavorable soil. On the other hand when high and low yielding trees are grouped in definite areas it seems entirely probable that these groups are due to soil conditions.

Ben Davis orchard No. 1 contains 37 rows with 29 to 37 trees per row. The orchard was divided into twenty-five blocks as shown in Table III. The number of trees per block varies considerably, due to missing or replanted trees, or to variations in rows or trees per row included in certain blocks. The distribution of the extreme types of trees is readily observed in Table III.

It will be noted that the total number of trees, the number and percentage of type 1 trees, and the number and percentage of type 3 trees for each block are shown. Thus in the block of trees including rows 1-8, and trees 1-8, we find a total of fifty-

Table III: Distribution of types of trees in Ben Davis Orchard
Showing in each block the total number of trees, number and percentage of Type 1, and number and percentage of Type 3.

Trees		1–8	9–16	17–24	25–32	33–37
33-	Total No. trees	28	12	8	1	0
	No. and % Type 1					
	No. and % Type 3	4–14	2–17			
25–32	Total No. trees	62	59	49	43	25
	No. and % Type 1	4–6	6–10	2–4	5–12	3–12
	No. and % Type 3	5–8		2–4	1–2	2–8
17–24	Total No. trees	64	60	56	36	31
	No. and % Type 1	8–12	4–7	9–16	15–42	5–16
	No. and % Type 3	4–6	2–3	4–7	1–3	4–13
9–16	Total No. trees	63	63	51	41	33
	No. and % Type 1	20–32	16–25	5–10	18–44	2–6
	No. and % Type 3	3–5	2–3	2–4	4–10	3–9
1–8	Total No. trees	51	57	56	49	33
	No. and % Type 1	3–6	8–14	1–2	2–4	1–3
	No. and % Type 3	15–29	15–26	26–46	27–53	17–52

N — S

Rows

one trees. Of these fifty-one trees, three or 6% are of type 1, while fifteen or 29% are of type 3. A study of the distribution of the two extreme types, 1 and 3, shows that they are in rather definite areas of the orchard. Most of the type 3 or unproductive trees are located along the west side of the orchard, especially towards the south end of this area. The location of the unproductive trees coincides very closely with the high sandy portion of the orchard. Clearly the grouping of the unproductive trees is due to unfavorable soil conditions or exposure. The type 1 or productive trees are grouped largely in the west-central part of the orchard, especially in the blocks including rows 1-16, trees 9-16, and the blocks including rows 25-32, trees 9-24. In these four blocks the percentage of type 1 trees varies from 25% to 44%. The grouping of productive trees in definite areas can only be attributed to unusually favorable soil conditions in these areas.[2]

It is clear that the various types of trees, productive and unproductive, are due to a considerable extent to soil heterogeneity. It is also evident that an unproductive type of tree when surrounded by a productive type, all having a more or less common feeding ground, cannot be attributed to unfavorable soil. The behavior of such trees indicates that the various types of trees may be caused by one or both of the other factors mentioned, i.e., root stocks or bud variation.

VARIABILITY IN PRODUCTIVITY DUE TO ROOT STOCKS

We shall consider next the influence of the root stock on type and yield. It is well known that seedlings grown for root stocks are extremely variable both in regard to morphological characters and growth. In our seedling orchard, the 586 trees which were planted in 1911 vary in circumference from two to eighteen cm. and the coefficient of variability was found to be $32.07 \pm .69$. Such great variability would be expected in the growth of seedling apple trees since all apple trees are more or less heterozygous and are usually cross pollinated.

So-called "standard stocks" may vary greatly in growth; Hatton (c) found about 14% of a block of "free stock" seedlings to be distinctly dwarfed and weak. About the same range of variability in root stocks was found in "free stocks," crab stocks, and paradise stocks. The latter stocks are generally considered dwarfing stocks, but both the "free" and "Paradise stocks were found to contain dwarfing and free growing stocks. "Paradise" stocks are apparently from different sources and the variety is not a true clonal variety.

In our "stock and scion" orchard we have over 400 trees of ten varieties. These trees were worked on "French Crab" and Tolman Sweet roots in 1913. An analysis of the data on this orchard shows that in circumference of trunk, in 1921, the trees worked on "French-Crab" stock are more variable than trees on Tolman Sweet roots. This is to be expected, since "French Crab" seedlings are from numerous varieties and types of trees. The Tolman stocks are a clonal variety and are less variable than French Crab stocks.

When the trees for the "stock and scion" orchard were taken from the nursery they varied considerably in size. If these differences in size were due to difference in the soil of the nursery we would not expect these differences to be permanent when the trees were transplanted in the orchard. The random planting of large and small trees should smooth out differences in growth if soil is the only factor involved. If, however, the variation in size of nursery trees is due to the effect of root stocks or scions then differences in size will persist in the trees when set in the orchard.

[2] The soil in our Ben Davis orchard was also found to be heterogeneous when measured by the test for soil heterogeneity proposed by Harris (2). For the average soil heterogeneity based on the yields of the 881 trees for 1914-18, $r = .40$. The individual tree was used as the ultimate unit and trees were grouped in a four by four fold manner for the combination plots.

The buds of each variety were selected from a single tree in each case, thus largely eliminating any possible difference in growth of scion due to bud mutation. The growth of different varieties on different stocks was not found to be the primary cause of correlation between size of nursery tree and the same tree in the orchard. We have found that the trees which are small when set in the orchard are also the small trees in succeeding years. The correlation between circumference in 1916, two years after the trees were set, and the circumference in 1921, was found to be very high (r = .68). We may conclude then that small trees in the nursery, in general result in small trees in the orchard, due to a considerable extent to the effect of the root stock.

In citrus trees Webber (j) has found great variability of root stocks, both in size and morphological characters. The variable root stocks are considered one of the primary causes of variability in nursery trees budded on such stock. Webber has shown that large, medium and small nursery trees of Washington navel and Valencia oranges and Marsh grapefruit retain, to a considerable extent, their relative sizes when grown in the orchard for several years. The growth of the different sizes of nursery trees is not given in detail and it may be questioned if the differences in size of orchard trees are significant. Webber attributes many of the irregularities in size and fruitfulness of orchard trees to the use of the seedling root-stocks.

Since root stocks grown from seeds are extremely variable and may often be weak and dwarfed it is not surprising that clonal varieties grafted on such stock varies greatly in growth and productivity. The presence of many unproductive trees in our Ben Davis orchard may be attributed, in part at least, to the effect of weak or incompatible root stocks.

VARIABILITY IN TREE TYPE AND PRODUCTIVITY DUE TO BUD VARIATION

In recent years much of the variability in performance of fruit trees within a clonal variety has been attributed to bud mutation. This belief has been strengthened by the work of Shamel and his colleagues with citrus fruits in California. As a result of Shamel's work there has been a general acceptance of the idea that bud mutation may cause increased or decreased yields, not only in citrus varieties but in other fruits as well.

In a paper, the publication of which has been somewhat delayed, we have analyzed in considerable detail the data pertaining to bud variation in citrus and apple varieties. We will therefore limit the present discussion of bud variation to the more important phases of the work.

Experiments on bud variation in apples have been conducted by Whitten in Missouri, Macoun in Canada, and Cummings in Vermont. Whitten (k) selected scions from an exceptionally poor Ben Davis tree and others from the best Ben Davis tree in the orchard. There was no significant difference in the performance of the progeny of the two extreme types.

Macoun (d) selected scions from a heavy bearing, a regular bearing, and a very unproductive tree in a row of 18 Wealthy trees. A comparison of four years yield of the progeny of the above trees shows no significant difference in the performance of the progeny of the three parental types. In actual amount of fruit the trees resulting from the most productive parent produced slightly less fruit than either the progeny of the regular bearing or unproductive trees. The differences were in no case statistically significant.

Recently Cummings (a) has reported the results of a rather extensive bud selection experiment in Vermont. Scions were selected from productive and unproductive trees of seven varieties. Two hundred and forty-eight scions were used, 120 scions from productive trees and 128 from unproductive ones. At the end of ten years 86 of the "productive" and 82 of the "unproductive" scions had borne fruit. In many cases the two classes of scions were grafted into the same variety

or even into the same tree. In general the scions from the productive trees were no more productive, in fact they were somewhat less productive, than scions from the unproductive trees. The difference in favor of the "unproductive" scions is probably not significant, but at least there is no indication that scions from productive trees are superior to scions from unproductive trees of a clonal variety. In other words the differences in performance of trees of a clonal variety of apples, in the above case at least, are apparently not inherent, but are the result of environmental factors.

The above experiments do not indicate that unproductive types of apple trees are due to inherent differences. Let us now examine the data on bud variations involving productivity in the citrus fruits.

Shamel and his colleagues (f-i) have published four bulletins giving records and performance of 151 Washington Navel orange trees, 105 Valencia orange trees, 117 Eureka lemon trees and 121 Lisbon lemon trees. In all cases trees of a clonal variety may vary greatly in performance. Certain tree types or "strains" are often associated with high or low productivity. An analysis of Shamel's data shows considerable grouping of high and low yielding trees, indicating that soil is probably an important factor in the differences in performance of the various strains. Unproductive trees have been top worked with buds from productive trees and although some of these trees have been top worked over eight years no records of their performance have been presented. *The only evidence presented to support the occurrence of inherent differences involving productivity in clonal varieties of citrus trees is the fact that among trees of the same variety, age, and under similar conditions some are low yielders and others are high yielders.*

There is no critical evidence in any clonal variety of fruit trees that bud variation is the cause of differences in productivity. Clonal varieties of apples are just as variable as clonal varieties of citrus trees, but independent workers using different varieties have all found no significant differences in the progeny of buds from productive and unproductive trees. That the results in the citrus, when finally presented, may be found to agree with those in the apple is indicated by the latest recommendations of Shamel. (U.S.D.A. Bull. 813, p. 84).

Until it is shown that buds from productive and unproductive trees of a clonal variety result in productive and unproductive trees respectively, the conclusion is not justified that differences in productivity of trees within a clonal variety are inherent. If such differences are not inherent, unproductive trees, such as our "Type 3," cannot be made productive by top-working with buds or scions from high yielding trees.

CONCLUSIONS

A study of 881 Ben Davis trees shows that productive and unproductive trees are closely associated with definite types or habits of growth. The productive, or type 1, trees are large, open and spreading, with short laterals and many spurs. The unproductive, or type 3, trees are small and upright with slender branches and few spurs. Between these two extreme types are a number of intermediate types.

Differences in productivity of trees of a clonal variety may be attributed to soil, root stocks, bud variation, or to unknown factors. In the Ben Davis orchard, soil was found to be an important factor in causing differences in type and yield of trees. The influence of favorable or unfavorable root stocks is also an important factor in tree growth and productivity. There is no critical evidence that differences in productivity within a clonal variety are due to bud variation. There is then no justification for top working unproductive types of trees with buds or scions from productive types. In the selection of root stocks it is advis-

able, as Webber has suggested, to use only large, vigorous stocks for grafting or budding. The use of clonal varieties of root stocks would undoubtedly result in more uniform and, in general, more productive trees.

LITERATURE CITED

a. Cummings, M. B.
1921. Apple cion selection from high and low yielding parent trees. *In* Vt. Agr. Exp. Sta. Bull. 221, p. 36-38.

b. Harris, J. A.
1913. On the calculation of intra-class and inter-class coefficients of correlation from class moments when the number of possible combinations is large. *In* Biometrika, v. 9, p. 446-472.

c. Hatton, R. G.
1920. Suggestions for the right selection of apple stocks. *In* Jour. Roy. Hort. Soc. v. 45, p. 257-268.

d. Macoun, W. T.
1916. The apple in Canada, its cultivation and improvement. *In* Dominion Exp. Farms Bull. 86, p. 27-31.

e. Shamel, A. D., Scott, L. B., and Pomeroy, C. S.
1918. Citrus-fruit improvement: A study of bud variation in the Washington Naval orange. U. S. Dept. Agr. Bull. 623, p. 1-146.

f. Shamel, A. D., Scott, L. B., and Pomeroy, C. S.
1918. Citrus-fruit improvement: A study of bud variation in the Valencia orange. U. S. Dept. Agr. Bull. 624, p. 1-120.

g. Shamel, A. D., Scott, L. B., and Pomeroy, C. S., and Dyer, C. L.
1920. Citrus-fruit improvement: A study of bud variation in the Lisbon lemon. U. S. Dept. Agr. Bull. 815, p. 1-70.

h. Shamel, A. D., Scott, L. B., and Pomeroy, C. S.
1920. Citrus-fruit improvement: A study of bud variation in the Eureka lemon. U. S. Dept. Agr. Bull. 813, p. 1-88.

i. Webber, H. J.
1920. Selection of stocks in citrus propagation. Calif. Agr. Exp. Sta. Bull. 317, p. 269-301.

j. Webber, H. J.
1920. The improvement of root-stocks. *In* JOUR. OF HEREDITY, v. 11, no. 7, p. 291-299.

k. Whitten, J. C.
1915. Bud selection for increasing yields. *In* Mo. Agr. Exp. Sta. Bull. 131, p. 479-480.

Mental Hygiene

MANUAL OF PSYCHIATRY, edited by Aaron J. Rosanoff. Fifth ed.; revised and enlarged. New York, John Wiley & Sons, 1920, pp. 684.

The manual is comprehensive. Although based on Kraepelin's classification, it finds room for Freud and 150 pages or more of mental tests. As to why one "goes insane," "The situation may be summarized as follows: at least three-fourths of all cases of mental disorders occur on the basis of bad heredity, alcoholism, drug addictions, or syphilis; an individual who is of normal ancestry, abstains from alcohol and habit-forming drugs, and remains free from syphilitic infection, is not seriously threatened with a mental disorder. But since alcoholism and syphilis are, in their turn, so generally connected either directly or indirectly with inherent mental defectiveness, it follows that heredity is, as long taught with characteristic clearness of thought and diction by the French school of psychiatry, the cause of causes of mental disorders." It is further indicated that "most of the inheritable mental disorders, are, like the trait of blue eyes, transmitted in the manner of Mendelian recessives," the publications of the Eugenics Record Office being cited to support this.—P. P.

WHAT IS THERE IN PHYSIOGNOMY?

I. THE SIZE OF THE NOSE

FREDERICK ADAMS WOODS
Lecturer on Biology, Massachusetts Institute of Technology

AS WE go on through life we all acquire a certain amount of critical discernment regarding the human face. Some people, whose occupations have naturally brought them in contact with a vast number of varying types, acquire special skill. Hotel clerks, for instance, physicians, lawyers, business leaders, travelling men, etc., become very adept in what is popularly known as "sizing people up." It is probable that girls begin this science of face study much younger than boys since they need it as a matter of defense and protection, and all through life women are perhaps superior to men as physiognomists. This is usually spoken of as woman's intuition, but there is probably nothing more mysterious about it than that women have paid more attention to the subject.

WHAT DO OUR "LOOKS" SIGNIFY?

Those who say there is nothing in physiognomy are for the greater part protesting against the extreme and absurd claims of all the cranks and quacks—first cousins and half brothers to the palmists, the astrologers and the phrenologists. For the admission that there is something in physiognomy is necessitated by common everyday experience. Great men certainly do not look like imbeciles, nor do Eskimos and African Bushmen look like courtiers and heroes. There is a line of truth to be drawn somewhere, but just where that line lies has never been determined, even approximately. The true methods of inductive science have not been applied to establishing associations between facial peculiarities and mental traits.

It is a fair hypothesis that at least some associations exist. Man has evolved from an ape-like ancestor characterized by a small nose, small eyes, retreating forehead and chin. Why should not the most intellectual of men depart more than the "common run" of men from such primitive proportions? Indeed, there is a widespread popular fancy that a high forehead and long nose are marks of intellect, and a heavy chin is a sign of force of character. In fiction and in the "movies" we see the conventional types, and they are usually represented in accordance with these time-honored beliefs.

Whether different proportions of the face have or have not any significance, there is one way in which the human countenance certainly expresses mental differences, and that is through its fluctuating expressions. There is perhaps no branch of knowledge which a human being begins to study so early in life as facial expression. Little babies soon know the difference between a smile and a frown. An intelligent dog will watch its master's face for every change of mood, hanging on the slightest indication of approval or encouragement. The knowledge of the meaning of the face is very important, since the need for the commendation of one's fellow men is almost universal and begins very young, for it harks back to earliest origins. Indeed the desire to be well thought of by the other members of one's own circle is a curious human peculiarity and is almost a prime distinguishing mark between men and brutes. It is probable that not many of the lower animals care at all what the others of their species think of them. Running horses and trotting horses very likely have something of this feeling. They appear to exhibit pride and emulation. So do fox hounds; and perhaps all the gregarious animals have in a crude way the basis for the evolution of this important

NOSES OF NINE GREAT MEN

Is intellectual superiority associated with a large or long nose? The pictures above constitute a random sample from a large collection of photographs of great men of history classified into three groups according to nose-size. Nos. 1 to 5 show long or large noses; they are respectively Paschal (1), LaFontaine (2), Cuvier (3), Michel de L'Hospital (4), Voltaire (5). The next two have been placed in the middle grade; they are Captain James Cook (6), and Arago (7). Numbers 8, Boileau, and 9, Talleyrand, are rare examples showing small or short noses. (Fig. 4.)

human attribute. Man, in one form or another, is always seeking glory,—the boy on the ball field, the child in attracting the attention of "grown ups," the college man in athletics, the mature man in business or professional success.

CHARACTER IN THE FACE

Habitual facial expression, such as comes from chronic gloom, seriousness on the one hand, or constant smiling on the other, doubtless causes wrinkles and permanent marks on the face, which in time give an indication of character or disposition. Firmness of will, and habits of concentrated thought are probably to a great extent shown in the eyes and mouth. But here we enter

Profile of Idealized "Average Man." (Fig. 5.)

unsurveyed fields. There is something in all these attributes, but the actual localization and the analysis and measurement of the significant peculiarities remain for future research to determine.

TWO PROFILE HEADS OF IDEALIZED "AVERAGE MEN" SHOWING AVERAGE PROPORTIONS

What does the "average man" look like to you? Has your conception been formed from your ideals or from the men whom you actually meet in everyday life? Most of us have usually regarded the average man "as something very fine." (Fig. 6.)

Physiognomy of expressions is one thing, and physiognomy drawn from proportions of the features is another. While no one doubts that expressions of the countenance are usually of some significance, there are many keen observers, more or less professionally engaged in the study of faces, such as portrait painters, sculptors, photographers, anthropologists and psychologists, who doubt if the *proportions* of the face are of any real significance. They believe the exceptions to any rules are too frequent for generalizations.

My own belief is that, by and large, most people look their parts, and furthermore if the method of scientific induction be applied much can be learned from a systematic study of facial proportions. There are, doubtless, exceptions to any rules, but these, if not too numerous, do not invalidate the conclusions. The whole question hinges on the numerousness of the exceptions, or in other and more scientific words, on the *existence of correlations*.

For about twenty years the present writer has been in the habit of collecting, from time to time, pictures of people out of newspapers, magazines and books, as well as engravings and photographs from painted portraits. Out of all this collecting certain general impressions have arisen, but only a few of these have as yet been put through systematic tests. Already the conclusion has been reached that there has taken place a genuine evolutionary change within the last four hundred years in the proportions of the upper part of the face. Some discussion of this question (with a few illustrative portraits) is to be found in the JOURNAL OF HEREDITY for May, 1919.

THE SIZE OF THE NOSE

The present article will deal solely with the nose, especially with the question whether or not intellectual superiority is usually associated with a large or long nose.

If the size of the nose is in any way correlated with intellectual superiority then the greatest men in history ought to exhibit noses measurably larger or longer than the average. The correlation might be true all through the scale of intellectuality, but it would be more difficult to measure it and prove it when close to the average, since the differences would be smaller.

With an idea of making a beginning on this problem, a large number of portraits of famous men in different fields of activity, and in different eras, have been put through some systematic tests. The first group examined happened to be a collection of portraits of eminent astronomers published in "Stars and Telescopes," a Hand-Book of Popular Astronomy by Professor David P. Todd (Boston, 1901). Judging from these pictures, I should say that the following astronomers, mathe-

maticians and physicists had noses approximately as in the list below:

	Nose
Copernicus	large
W. Herschel	average
Fraunhofer	long
Delambre	large
Hansen	average
Delaunay	average
Halley	large
Kirchoff	long
Helmholtz	average to heavy
Oppolzer	small
S. J. Perry	average
Tycho Brahe	large
Kepler	large
Newton	long
Euler	large
La Grange	long
Gauss	long
Airy	large
Gassendi	long
C. H. F. Peters	long
Cassini	long
B. Peirce	long
Le Verrier	long
Adams	long
Tisserand	large
Mary Somerville	long
Watson	rather small
Olbers	long
Arago	long
Kaiser	average
Caroline Herschel	rather large
Maria Mitchell	rather large
Chladni	long
D. Olmsted	long
Winnecke	small or average
W. C. Bond	average
Kant	long
La Place	average
Lord Rosse	large
Heis	long
Argelander	average
B. A. Gould	long
Schönfeld	average
Bessel	long
C. A. F. Peters	small
Brünnow	average
Glydén	very large
Struve	average
Dawes	average
Doppler	long
Secchi	average
Henry Draper	average or small
J. Herschel	long
R. A. Proctor	average
Lamont	average
Huygens	average

There are 34 with large or long, 17 with average, and five with short or small noses. The large or long noses are more numerous than the other two grades added together. This was confirmed by the independent judgment of another person, the check figures being 31-22-3.

Own Opinion	Check Opinion: Large or Long	Average	Small or short	Totals
Large or Long	26	8		34
Average	5	12		17
Small or Short		2	3	5
Totals	31	22	3	56

The correlation between the two independent judgments is shown in the squares above. There are 26 instances in which the nose seemed large or long to both observers, twelve cases in which it seemed average to both, and three cases in which it seemed small or short to both. It will be noticed that there are no cases in which a nose was judged large or long by one, and small or short by another. The scattering instances of slight disagreement in classification are shown in the figures 5, 8 and 2. To physical anthropologists accustomed to measuring shapes of heads with accurate instruments (brachycephaly, etc.) the idea of measuring the features of the face by general impressions may seem unsatisfactory; but it appears from the data presented in this article that such a method is capable of yielding orderly and consistent results. If this method can be used in physiognomy it means that rapid progress can be made towards at least first approximations in evaluating the relationships that do exist, as well as in demonstrating those which do not.

While it is easy to measure head-forms among large numbers of the general population, it is not so easy, with instruments, to measure the size of the nose in proportion to the size of the

face, or measure the proportions of the various features to each other,—mouth, eyes, upper lip, chin, etc. Furthermore, if we wish to study the faces of "great men" it is more difficult still to go about the world capturing "great men" and measuring their noses. There are never many really great men alive at any one time, but there have been a good many men in the world's history acknowledged as great, and these have nearly always left their portraits behind them. So if there is any way of using these painted records, abundant material is placed at once at our disposal. Also we have the modern photographs of recent and living men, who are among the most eminent of their time. These can be compared with groups of men a little less eminent, and the latter with other groups less eminent still, until the true average or mediocre class is reached.

The second random test happened to be taken from a work called "Orators of England" edited by Guy C. Lee, (2 vols., Putnam, 1902). These appear to me to be classifiable as follows:

	Nose
R. B. Sheridan	average
Francis Bacon	large
Sir John Eliot	long
Thomas Wentworth	average
Oliver Cromwell	large
Sir Henry Vane	long
Heneage Finch	large
Robert Walpole	average
W. Pitt (Chatham)	long
Earl of Mansfield	long
E. Burke	long
W. Pitt, Jr.	average
Charles James Fox	large
Macaulay	average
Lord Erskine	long
Canning	long
Sir James Mackintosh	small
Sir Robert Peel	long
Lord Brougham	large
Lord Lytton	long
Disraeli	long
Gladstone (at 69)	large
Gladstone (at 31)	large

This is a list of very famous men indeed. At least thirteen of the twenty-two are so famous as to have been heard of by all educated English speaking people, and that means a very great distinction, as there are probably not as many as three hundred persons in the whole world's history whose fame is great enough to meet that test.[1] R. B. Sheridan, Francis Bacon, Cromwell, Walpole, Chatham, Burke, W. Pitt, Jr., Charles James Fox, Macaulay, Peel, Lytton, Disraeli, and Gladstone are the thirteen whom I presume would mean at least something to every educated English or American person.

My own estimate shows, out of a total of twenty-two, sixteen with noses large or long, five average, and one small or short. The check opinion gives 15, 7, 0, and is confirmatory. The large or long are twice as numerous as the other two grades.

The next test is taken from Vols. 5, 8, 9 and 10 of the same work: "Orators of Modern Europe" and "Orators of America." The lists follow.

"Orators of Modern Europe," Edited by Guy C. Lee. N. Y. and London—1902. (Putnam):

	Nose
Lamartine	long
Mirabeau	average
Vergniaud	small
Robespierre	average
Danton	average
Bonaparte	long or average
Chateaubriand	average
Kossuth	average
Mazzini	long
Gambetta	large

"Orators of America," 1910. 3 vols., Edited by Guy C. Lee:

	Nose
Hamilton	long
James Otis	average
John Dickinson	long
John Hancock	average
Patrick Henry	long
Edmund Randolph	average
Samuel Adams	large
John Witherspoon	long
George Washington	large
Henry Lee	average
Daniel Webster	large
John Q. Adams	long
Fisher Ames	long
Thomas Jefferson	long
William Wirt	long

[1] Statement based on experience in presenting lists of famous men to groups of friends and acquaintances.

Henry Clay	large
William Pickering	large
John Randolph	average
Thomas Benton	large
John C. Calhoun	average
Edward Everett	average
Rufus Choate	long
Charles Sumner	long
Stephen A. Douglas	average
Wendell Phillips	long
W. H. Seward	large
Robert Tooms	average
Jefferson Davis	average
Abraham Lincoln	large
Alexander H. Stephens	average

Here the ratios are 23 long or large, 16 average, and one small or short. The check opinion is 22-17-1. The names are not quite so eminent as those from England and the ratios of long and large against the other two are not quite so weighty; but the figures are not large enough for this to be worth more than a suggestion. One thing these tests demonstrate is that the method itself is sound. They show that two persons can look over a series of portraits and (without one knowing what the other has done) receive very similar impressions.

The next test is taken from nineteen portraits of modern American "captains of industry." All but about two of these are well known to everyone.

"Millionaires and Kings of Industry" by J. Burnley, 1901.

	Nose	
A. Carnegie	large	photo
J. D. Rockefeller	average	engraving
P. D. Armour	small	engraving
W. A. Clark	long	photo
Jay Gould	long	photo
C. M. Schwab	average	photo
C. T. Yerkes	long	photo
J. P. Morgan	large	photo
Sir Hiram Maxim	long	photo
G. M. Pullman	large	drawing
C. R. Flint	small	photo
Thomas Edison	long	photo
W. Cramp	long	engraving
James J. Hill	large	photo
James G. Bennett	large	photo
Claus Spreckels	long	engraving
John Wanamaker	average	drawing
Henry Clews	long	photo
Frederick Pabst	average	photo

It may be noticed that one of those whose nose is adjudged small is certainly not as widely known as nearly all the others.

The ratios are thirteen large or long, four average, and two short or small. The check opinion gives 11-7-1. This collection is interesting as exemplifying more modern processes of representation. It is difficult to say just where these men should be rated in comparison with the astronomers, orators and statesmen given in the foregoing tests; but it does not matter for the purposes at hand. They are certainly a representative group and, as far as their own fields are concerned (practical invention, organization and business enterprise), they are very much more eminent than the thousands of others in the same fields who are what may be called "successful" or "distinguished." They are certainly very widely known and "famous" in the dictionary sense of the word. Whether they are more meritorious than others not so widely known, or whether they are really more intellectual or not, may be a matter of debate. But if we can show that the lesser sort of men in their own department of activity have, on the average, noses less large than they, it is indicative of *something*. It cannot be mere chance.

"Who's Who in America" has been much used in sociological studies. Such a list, containing as it does about 20,000 names, gives an average eminence well above mediocrity yet well below "celebrity," "world-eminence," "greatness" or whatever word is chosen for your one man in a million or more. There are no portraits in "Who's Who in America," but the Canadian Who's Who, which bears the title "Who's Who and Why," is replete with portraits. As the total population of Canada is only about seven millions and this book is about half as large as the American "Who's Who," it is fair to say that the standard of inclusion is there lower, but this is rather an advantage than otherwise. The Canadian work contains a very high proportion of the Scotch race, and a good many of French and Irish origin, so that for some purposes it might lead to wrong conclusions, but probably not in this inquiry. An ex-

amination of these and other portraits has confirmed the supposition quite definitely that men of moderate distinction do not as frequently as very great men possess noses that are strikingly large or long. All the portraits under the initials A, B and C have been classified, as in the three accompanying tables, and it can be seen that they confirm each other, so that it does not appear necessary to carry the investigation into D, E, F, etc. The effect of picking out the surnames that are not strictly Anglo-Saxon in origin and dealing only with the Anglo-Saxon does not alter the conclusion. In the table for the totals, letters A, B, C, we see the distributions: first opinion, 52-167-45, second or check opinion, 74-151-39. These become for strictly Anglo-Saxon names, 34-109-26, and 51-93-25. The weights are all in favor of the large or long, first number, as against small or short, third number; but the first number is never equal to the sum of the other two, as was the case among the "great men."

A glance at the Chart (Fig. 7) shows two types of lines. All those pointing upward at the center, making a sort of roof-like, or mountainous structure, depict the percentages of the three classifications from the Canadian Who's Who, letters A, B and C. The continuous lines are from opinion No. 1; the dotted lines from opinion

Check Opinion

Own Opinion	Large or Long	Average	Small or short	Totals
Large or Long	8	2		10
Average	8	17	3	28
Small or Short		1	3	4
Totals	16	20	6	42

LETTER A

Check Opinion

Own Opinion	Large or Long	Average	Small or Short	Totals
Large or Long	17	9		26
Average	16	56	9	81
Small or Short		13	13	26
Totals	33	78	22	133

LETTER B

Check Opinion

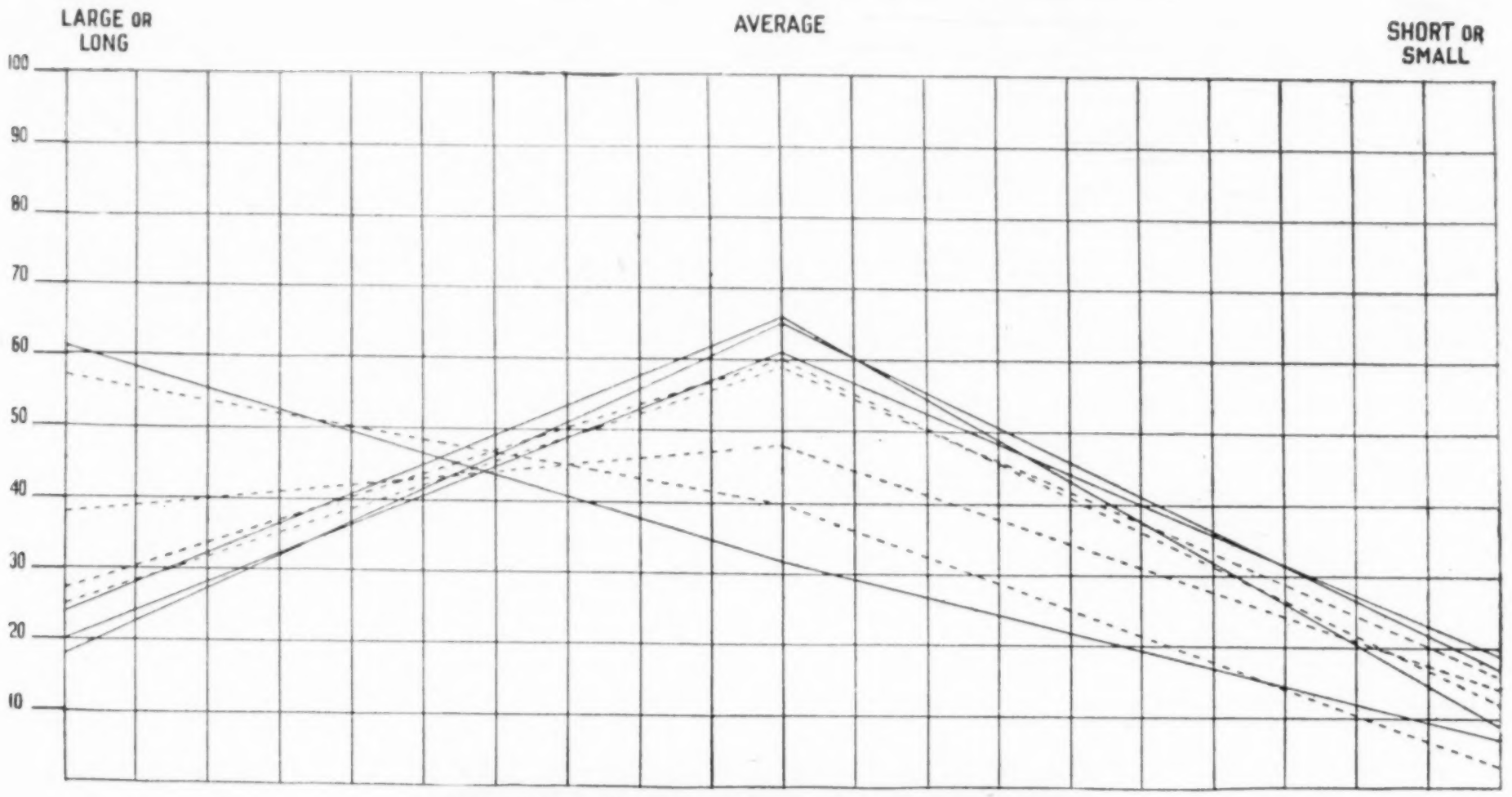
Own Opinion	Large or Long	Average	Small or Short	Totals
Large or Long	14	2		16
Average	10	42	6	58
Small or Short	1	9	5	15
Totals	25	53	11	89

LETTER C

Check Opinion

Own Opinion	Large or Long	Average	Small or Short	Totals
Large or Long	39	13		52
Average	34	115	18	167
Small or Short	1	23	21	45
Totals	74	151	39	264

TOTAL LETTERS A, B, C
in Canadian "Who's Who."



RELATION OF FAME TO NOSE SIZES

The two lines which slope downward from left to right show the distribution of nose sizes among the so-called "great men" of history. The lines that point up in the middle show a different distribution. The latter are adapted from the Canadian "Who's Who." The figures at the left are percentages. (Fig. 7.)

No. 2. The second type of line is like a long sloping roof, high at the left and low at the right. This depicts the percentages from the distribution among the first 147 so called "great men,"—astronomers, mathematicians, orators, statesmen, and great captains of industry. The two opinions agree very closely and give for the "great men" a preponderating weight to the long or large-nosed type—greater than the sum of the other two. The first opinion gives in percentages 61-32-7; the second opinion gives 57-40-3.

Another test was then made by a somewhat different method. The basis of the test was a group of photogravure portraits cut out of current popular magazines. These were taken at random consecutively. All pictures were included, except a very few that were too small or too vague. They were then classified into the three grades. The number of large or long noses came out thirty, the number of average 64; and the number of small or short was ten.

Now which of these three nose groups contained the greatest proportion of eminence? In this instance I have not put the question of eminence, greatness or intellectual superiority to any strict tests, but have made the test into being widely known or "famous." Out of the first group thirty, "large or long" I submit the following thirteen names as being famous or at least widely known in the United States. They are arranged in the accidental order of their inclusion: Lord Strathcona, Senator Gorman, Brander Matthews, George Randolph Chester, Lord Bryce, Goldwin Smith, Sir William Ramsay, Dr. Morton (Demonstrator of anaesthesia, by ether), Mr. McClure (of *McClure's* Magazine, etc.), Senator La Follette, Senator Quay, G. Marconi, Rudyard Kipling.[2]

Out of the sixty-four in the group of average noses the following are submitted as famous names, or at least widely known in the United States: Gilbert Chesterton, Sir George Darwin, Theodore Roosevelt, A. Lawrence Lowell, Lord Reading, Robert Lansing, Rev. "Billy" Sunday, Joseph Conrad, Mark Hanna, George Harvey, Vilhjālmur Stefansson, George Westinghouse.

Here there are twelve names, but

[2] Kipling is on the border line as to size of nose.

they are out of sixty-four instead of thirteen out of thirty.

I do not print the names of those less well-known. There are seventeen in the group "large or long," and 51 in the central group. It is quite possible, indeed probable that some of those omitted from the famous list should be included; but I am sure that there are not more than seven such in the middle group who would if included raise the number to twenty instead of thirteen. But even with these included, the large-long nosed fraternity would beat the averaged nosed people in point of fame. There are furthermore, on the more liberal basis of what constitutes fame, at least three from the "large-long" group who must be added. There is in the group of ten small nosed men but one single instance of a very famous man. This exception is Lord Lister. Some might call his nose average, but he is placed among the small nosed group, and the benefit of the doubt may be given to an opponent of the present theory.

Another way of testing this problem is to make a list of the very greatest men in all history, in point of fame, and then examine the portraits of as many of them as possible. Here is a partial list. All these are among the most eminent men who have ever lived. There can be no doubt about their fame. Whether they be "great" or not is another matter. For instance people might dispute as to whether Napoleon should or should not be called "great," but no one can dispute the fact that he is eminent in the sense of attracting a tremendous amount of interest, occupying great space in the shelves of libraries, and time in the thoughts of men. These names are part of a list of preëminent men (no longer living) which I am preparing by the objective methods of historiometry. There is no bias in it one way or another towards this test, so it does not matter just how the list is being made.

LARGE NOSES OR LONG NOSES:

Descartes, Luther, LaFontaine (Fig. 4), Fenelon, Paschal (Fig. 4), Cuvier (Fig. 4), Renan, Ampere, Tasso, Meyerbeer, Newton, Van Dyck, Copernicus, de Musset, Goethe, Liszt, Heine, Pasteur, Colbert, John Fox, Calvin, Titian, Tintoreto, Aritino, Lamartine, Gerson, Helmholtz, Kepler, Kant, J. Herschal, F. Bacon, Cromwell, Pitt the Elder, Burke, C. J. Fox, Peel, Disraeli, Gladstone, Gambetta, Alexander Hamilton, Washington, Webster, Thomas Jefferson, Lincoln, Pasteur, L'Hospital (Fig. 4), Hayden.

AVERAGES NOSES:

W. Herschel, La Place, Pitt the younger, Macaulay, Bonaparte (or long), Kossuth. Bismark, Hugo, Brantôme, Mozart, Wolsey, Lafayette, Voltaire[3] (Fig. 4), Dumas, Moliere, Beethoven, Turenne, Racine, Byron, Robespierre, Cavour, Franklin, Thiers, Fulton, James Cook (Fig. 4), Gluck, Corneille, Arago (Fig. 4).

SMALL OR SHORT NOSES:

Murillo, Danton, Lister, Boileau (Fig. 4), Beranger, Talleyrand (Fig. 4).

This list is merely a fragmentary one, but the great preponderance of the first group over the sum of the other two makes it highly confirmatory of all the previous tests.

Still another test was made from some entirely different data where classifications according to intellect had already been made for an entirely different purpose. My publication "Heredity in Royalty" 1906 contains sixty portraits of adult males suitable for inclusion in the present research. These were graded for intellect in a scale of ten, ten being the highest and one the lowest. Those from seven to ten are, in the combined opinions of historians, superior to those in five and six, which in turn may be called the average types of royalty, and are superior to those in grades one to four. A test made by classifying these por-

[3] Some portraits make Voltaire's nose long, see illustration.

traits according to three grades of size of nose does show a slight relationship, in conformity with the other results here given, but the correlation is a small one (about r=.10) and the probable error necessarily large, since the total number of cases is small, being only sixty-nine. The distribution is forty large or long noses, twenty-four average and five small or short. It has always been my impression from the time I first formed a collection of engravings and photographs of royalty, some fifteen or twenty years ago, that their noses were longer than the average. A long nose, a prominent under jaw, a finely modeled mouth, "cupid brow" as it is called, thick in the center and pointed or dimpled in the corners, eyes rather near together and nose delicate at the top, the whole face long and narrow, constitute the general facial characteristics of this special breed.

The distribution of nose-sizes given above bears out, as far as this one point is concerned, a hitherto vague and immeasured impression, and if the noses of royalty are larger or longer than those of the middle and lower classes it confirms, as far as it goes, my contention made in "The Influence of Monarchs" (1913) that royalty as a group taken through the ages has been distinctly superior in natural intellectual capacity to the average of their subjects.

WHAT CONSTITUTES THE "AVERAGE MAN"

This leads to a discussion of what constitutes the "average man"; and before taking up the question of the size, shape and significance of the nose of the average man, it is absolutely necessary to pause, and ponder on some hitherto but little recognized facts.

Clerks, salaried men, school teachers, small-town doctors and lawyers, farmers and shopkeepers are often spoken of as forming the middle class; but these people really do not belong to the *middle* class in the sense of representing the average or most numerous class in the community. They are really considerably above the middle or average, which, in the social scale, is occupied by that vastly more numerous class, the laboring class. These alone, if all the skilled and unskilled artisans be included and added to the number of strictly unskilled laborers, make a total so great as necessarily to establish the average. This "average man" whom until recently we were wont to regard as something very fine, we now know, thanks to the army tests, and other mental age tests, to really possess an intellect of about the mental age of a full grown boy. The mental age of fourteen is as high as the average man climbs.

The reason why we should expect more, is interesting to consider. It is probably not gained from the opinions of people whose business in life is to employ and direct labor. Their conversations on this point are not complimentary. Complaints are always heard of their difficulties in finding such qualities as ambition, mental energy, and efficiency. Yet the average man believes that the "average man" is "just about all right" or "quite the proper thing." The truth of it is that the printed or spoken expression "average man" conveys a imaginary ideal that is entirely at variance with reality.

This is partly due to the influence of the newspapers. They cater to the general public, and consequently tend to create an idealized and mythical being who really scarcely exists. This imaginary man, who is supposed to be so frequently seen, but really is so rare, is given form and color in our imagination, not only every day through the press, in the writings of reporters and editors, but the multitudinous sign advertisements that greet the willing or unwilling eye at every turn tend to implant forever in the memory the well balanced type of countenance. Whether our ideal citizen be seated at his breakfast table ordering his patent breakfast food with his pretty wife and nice children, or putting on collars or underwear, he is

always a finely proportioned being both in face and figure, so here, there, and everywhere, the delusion is conveyed and multiplied that the good looking man is the average man. This is not at all true, and one way to prove it is simply to look at people *separately*, one after another, and do a little mental arithmetic.

By taking a number of photographs of people in precisely the same position and over-imposing one upon another, the well known composite photograph is made. But the typical or usual human being is not a composite. Very few people look at all like a composite photograph. Each taken separately varies, more or less, some in one feature, and some in another. Everyone looks different from everyone else, as everyone knows; but how many people have ever thought how astonishingly variable the faces of the people one passes on the street really are? Most people do not look at each face separately, but if every single face is scrutinized separately and mentally recorded, the truth of this general variabiiity, in other words, general ugliness, becomes obvious. This can be done on a not too crowded thoroughfare, in a trolley car, or railway station. The present writer has whiled away many an hour in this lazy, but not unprofitable occupation of looking at people separately, instead of collectively. One of the best opportunities in the world for seeing what the average man really looks like comes once a year on Labor Day, when, for anthropological instruction, men are selected, classified and labeled. Let anyone of intelligence, education, and maturity stand on the curbstone as a Labor Day parade swings by, and look at each single face with an idea of mentally adding up the total number of faces that approximate the composite face of the idealized working man—such a face for instance as one sees in drawings marked Labor. Sometimes he is shaking hands with conventionalized Capital, always a stout gentleman in silk hat, and formerly with side-whiskers. Sometimes he is quarreling with said stout gentleman, in which case neither party is a subject for flattery from the artist's pencil, but the true standard figure, the one that remains in the mind, is always the idealized or composite, not the true or usual.

To test this, let the reader turn to the first popular magazine at hand and go through the advertisements or illustrations. The present writer did this after writing the above sentence, and the accompanying cut (Fig. 5) was the first one found. It shows the point very well. Here we have a well balanced and rather attractive face' the nose average or slightly long, straight, well formed and thoroughly in harmony with the other features. The second and third pictures found are also reproduced (Fig. 6). They are the two symbolic figures of labor illustrating an article on the conditions of labor. Naturally these are idealized and rendered attractive, almost refined in expression. They are here placed face to face and the rest of the picture is omitted.[4]

Of course, it cannot be said that faces like this do not occasionally exist in the world of reality, but they are certainly rare. Their rarity can only be appreciated by one who seeks to find them either on the street or at some other spot where genuinely average men can be seen in numbers.

The person who searches for facial beauty in crowds, either of men or women, will, according to his standards, probably find one face in from ten to twenty, not that will satisfy, for that is another story, but that will conform to standard proportions. In other words more than nine-tenths of the faces one passes on the street have some feature radically wrong. It may be the nose, it may be the mouth, lips, chin, etc. The reason for dwelling on all this is, that there is a sort of paradoxical statement true of the face of the average man. In one way his features are average in another way not. The forty Canadian soldiers (Figs. 8-10)

[4] All three pictures are from Hearst's International Monthly.

CANADIAN SOLDIERS

The soldiers in this and the two following illustrations were photographed by a well-known Canadian photographer while they were on their way overseas. They naturally came from all over Canada, and are representative men. The pictures were selected at random from a very large collection, and out of a group of forty-one, those shown above have been adjudged by the classifiers to have one of the frequent attributes of mental superiority—a nose longer or larger than the average. If, therefore, any reader sees his own picture here towards the head of the list, he cannot take offense! (Fig. 8.)

show this variation, although they are doubtless selected for physical fitness.

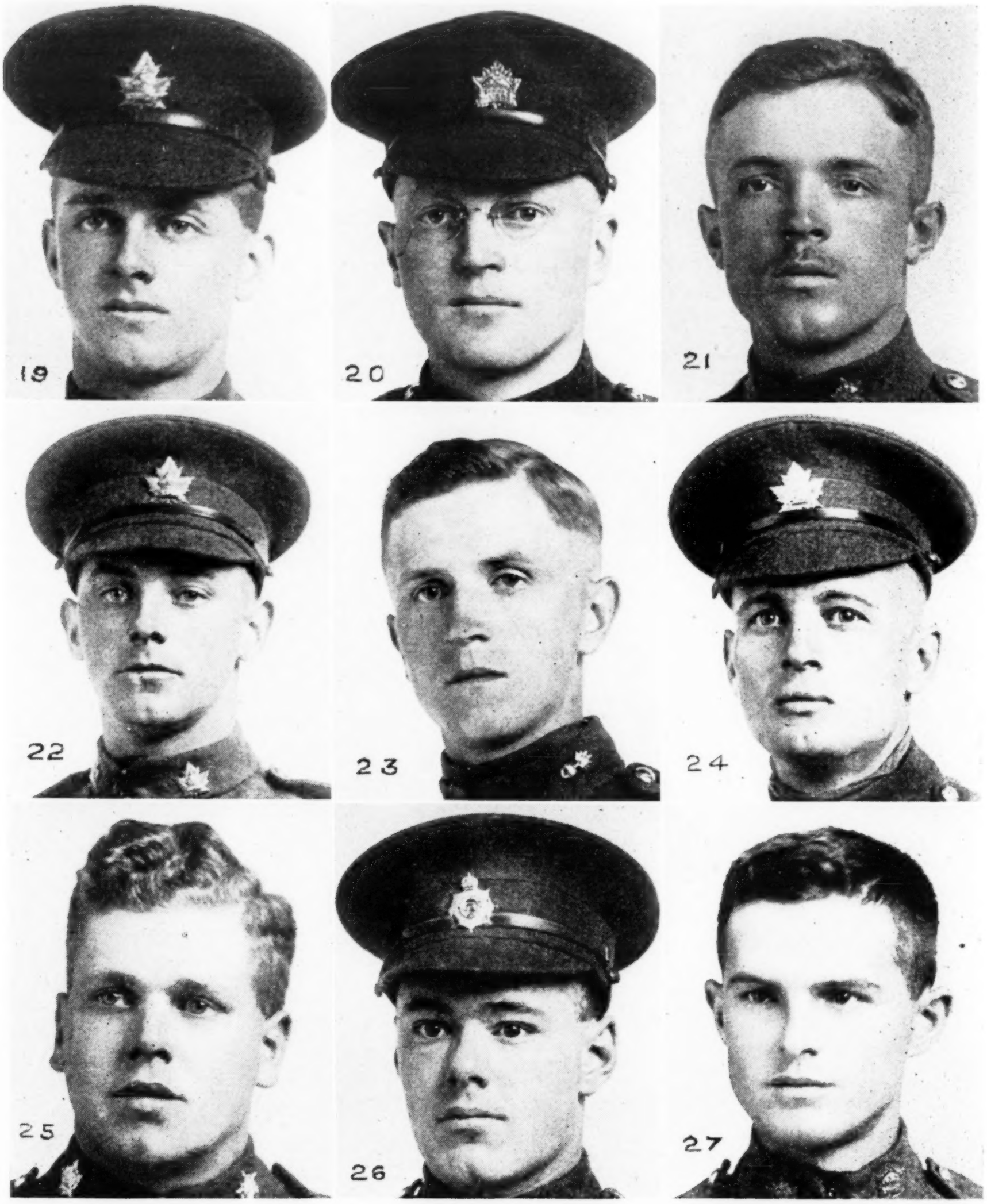
Let us limit our discussion to the nose, by way of illustration. If we examine a large number of faces, or photographs of the truly average class, say wage-earners who in 1913 earned about two to three dollars a day, and in 1919 about five or ten, we will find a very great variation in shapes and

AVERAGED SIZED NOSES

These pictures (1-27, Figs. 8, 9, 10) are arranged in the order of the sizes of their noses according to the combined opinions of ten different people. Only the first seven were adjudged long or large. (Fig. 9.)

proportions of the features. But if we classify the noses alone, by the method of general impressions, into three grades, just as we have done for the celebrated, famous and distinguished, we find the large or long-nosed variety comparatively rare, somewhat rarer than the small or short, and much rarer than the average.

The first random test made on the first material available happened to be on a group of faces or employees in a large department store in Montreal (Scroggie's, 1914). Out of thirty-five men, middle aged and young, five appeared to belong in the large or long group, twenty in the middle, and ten in the small or short. The inde-



AVERAGED SIZED NOSES

These photographs and those on the preceding pages were taken at random to get a comparative idea of the average nose of the average man. But these were picked men who enlisted in the early years of the war and many are decidedly above the true average. Numbers 28 to 40 of the small or short nosed group are not here reproduced. (Fig. 10.)

pendent check opinion gave three, thirty, two. These persons it must be remembered are somewhat above the true median class of society.

The second test was also made on men probably slightly above the average. This has been developed into a series of check tests and merits detailed description. J. E. Livernois, Ltd., one of the oldest photographic firms in Canada, took a very large number of photographs of enlisted men, in the early years of the war, without charging any fee for the sittings, and with the

privilege of reproducing and distributing to newspapers and magazines. Of this large collection I ordered forty chosen at random by Mr. Livernois. I told him I wished to make a study of faces but did not tell him of any theories that I had in mind, or of any of the tests. He took these pictures from his collection one after another, just as it happened to be easy for him to find a negative, and have it printed, therefore the forty Canadian soldiers ought to be a good random sample. They came from all parts of Canada, and were on their way overseas. The forty proved to be forty-one, as one accidental duplicate got included, which was not discovered until after some of the tests were made; but this has been allowed to remain in the collection, as it is amusing to see how often people put the same face in two different classifications.

Ten persons, some more or less expert in the art of judging faces, or trained in habits of scientific observation, have classified these forty-one pictures putting long *or* large noses in one pile, short *or* small in another, and reserving the middle pile for all those that did not strike the eye as belonging in either of the two outer groups. No observer was aware of the classification of any other observer, as the record marks were placed on the backs of the photographs.

These tests show that whereas there is considerable variation as to individual pictures selected for the three grades, the proportions in the end are sufficiently uniform to satisfy the purpose at hand.

Even for the individual pictures selected, there is good and significant correlation between the judgments of any two observers. Roughly these correlations are about $r = .20$ to $r = .50$.[5]

Here are three specimens, in the accompanying squares, of my own first classification compared with the first three other independent judgments.

Opinion of A. E. W.

Own Opinion	Large or Long	Average	Small or Short	
Large or Long	3	2	1	6
Average	7	8	9	24
Small or Short		4	7	11
	10	14	17	

$r = .39$

Opinion of W. W. C.

Own Opinion	Large or Long	Average	Small or Short	
Large or Long	3	3		6
Average		19	5	24
Small or Short		6	5	11
	3	28	10	

$r = .35$

Check Opinion

Own Opinion	Large Long	Average	Small Short	
Large Long	5	0	1	6
Average	7	11	6	24
Small Short		6	5	11
	12	17	12	

$r = .42$

[5] Method of rough approximation, given by Yule, Phil. Trans. A. CXCIV, 257-319.

AVERAGED SIZED NOSES

These photographs and those on the preceding pages were taken at random to get a comparative idea of the average nose of the average man. But these were picked men who enlisted in the early years of the war and many are decidedly above the true average. Numbers 28 to 40 of the small or short nosed group are not here reproduced. (Fig. 10.)

pendent check opinion gave three, thirty, two. These persons it must be remembered are somewhat above the true median class of society.

The second test was also made on men probably slightly above the average. This has been developed into a series of check tests and merits detailed description. J. E. Livernois, Ltd., one of the oldest photographic firms in Canada, took a very large number of photographs of enlisted men, in the early years of the war, without charging any fee for the sittings, and with the

privilege of reproducing and distributing to newspapers and magazines. Of this large collection I ordered forty chosen at random by Mr. Livernois. I told him I wished to make a study of faces but did not tell him of any theories that I had in mind, or of any of the tests. He took these pictures from his collection one after another, just as it happened to be easy for him to find a negative, and have it printed, therefore the forty Canadian soldiers ought to be a good random sample. They came from all parts of Canada, and were on their way overseas. The forty proved to be forty-one, as one accidental duplicate got included, which was not discovered until after some of the tests were made; but this has been allowed to remain in the collection, as it is amusing to see how often people put the same face in two different classifications.

Ten persons, some more or less expert in the art of judging faces, or trained in habits of scientific observation, have classified these forty-one pictures putting long *or* large noses in one pile, short *or* small in another, and reserving the middle pile for all those that did not strike the eye as belonging in either of the two outer groups. No observer was aware of the classification of any other observer, as the record marks were placed on the backs of the photographs.

These tests show that whereas there is considerable variation as to individual pictures selected for the three grades, the proportions in the end are sufficiently uniform to satisfy the purpose at hand.

Even for the individual pictures selected, there is good and significant correlation between the judgments of any two observers. Roughly these correlations are about $r = .20$ to $r = .50$.[5]

Here are three specimens, in the accompanying squares, of my own first classification compared with the first three other independent judgments.

OPINION OF A. E. W.

Own Opinion	Large or Long	Average	Small or Short	
Large or Long	3	2	1	6
Average	7	8	9	24
Small or Short		4	7	11
	10	14	17	

$r = .39$

OPINION OF W. W. C.

Own Opinion	Large or Long	Average	Small or Short	
Large or Long	3	3		6
Average		19	5	24
Small or Short		6	5	11
	3	28	10	

$r = .35$

CHECK OPINION

Own Opinion	Large Long	Average	Small Short	
Large Long	5	0	1	6
Average	7	11	6	24
Small Short		6	5	11
	12	17	12	

$r = .42$

[5] Method of rough approximation, given by Yule, Phil. Trans. A. CXCIV, 257-319.

These are better than the correlation for the two independent judgments regarding the portraits in the Canadian "Who's Who." There it was r = .29 approximately. If the same observer is asked to classify the same material a second time, or a third time after several intervening days, these correlations (between his own successive judgments) will be high, even though he has forgotten the individual faces.

I found my own classifications correlated r = .62 between a first test and a second test taken several weeks afterwards, and r = .60 between the second tests and a third taken a few days later. The first and second classifications made by Mr. A. E. Wiggam gave an approximate correlation of r = .75 and the second and third r = .81. In time, anyone's two judgments would give a correlation approaching perfection, or r = 1.00, but that would come about only as one grew acquainted with the faces and remembered where they were put before.

All these correlations have an importance to the science of physiognomy, not because of their accuracy (for they are only rough first approximations) but because they prove that the method of visual judgments may be sometimes successfully employed.

Here the chief interest lies in the fact that every one of the ten observers agreed in making the total number of large or long nosed Canadian soldiers a small number, compared to the sum of other two groups. The figures below show the opinions of the observers.

Twenty-seven of these pictures are here reproduced (Figs. 8-10), they are arranged in the order of the sizes of their noses, according to the combined and averaged opinions of the observers. Four pictures in the middle grade have been omitted merely for convenience in representation on the pages of this journal, and the nine at the extreme end of the small or short nosed group have also been omitted so that no one could possibly take any personal offense at the utilization of this material.

	Large or Long	Average	Short or Small
F. A. W.	6	24	11
A. E. Wiggam	10	14	17
W. W. Churchill Portrait Painter	3	28	10
E. K.	12	17	12
Mrs. Wiggam	5	9	27
M. T.	6	21	14
D. Fairchild	9	27	5
O. Olson	14	18	9
Mrs. Pearl	2	12	27
R. Pearl	4	17	20
Totals	71	187	152
A. E. W. 2nd Test	5	13	23
A. E. W. 3rd Test	10	15	16
M. T. 2nd Test	8	24	9
F. A. W. 2nd Test	7	16	18
F. A. W. 3rd Test	6	24	11

The totals 71-187-152 give, when reckoned as percentages of the grand total, 17.3—45.6—37.1. The inclusion of the five repeated observations does not alter the result even as much as one per cent, and is therefore omitted.

The distribution from the group of Montreal department store employees was 5-20-10 or 3-30-2 with a total 8—50—12. This if in percents is 11.4—71.4—17.1, or in other words the middle group is the largest, and the small or short is next; just as was the result from the combined tests on the Canadian soldiers. The average of these two sets of tests on "average men" is 14—59—27.

Subsequently some tests were made on the photographs in Harvard "Class

Albums" to see if the results would fit with those already obtained, and also to see if there is any marked tendency for the nose to enlarge with age. The data are not sufficient to answer the latter question but it appears that the changes with advancing age are merely in the nature of a greater variability. Probably in some, the nose continues to grow, in others the rest of the face becomes heavy in comparison with the nose. The Canadian soldiers were comparatively young, probably about the age of college graduates. The Harvard photographs, being from a presumably higher selected social and intellectual group in the community, ought to show a higher percentage of large—long and a lower percentage of short—small than the enlisted men from Canada.

From the Harvard Class Album of 1920 I made the ratios 9—34—19 on the first 60. Mr. Wiggam's independent estimate was 29—21—10. The two combined give 38—55—29.

I then went through Report VII of the Class of 1886. Here photographs are given of the students at the time of graduation, and also pictures taken twenty-five years later. I examined the first sixty examples, first the young graduates in turn, covering up with a slip of paper, all the adults, and then repeated the process concealing the youthful likenesses and concentrating on the adults. In this way one can measure a double error. If the nose did not change in proportion to the rest of the face, and if one's judgment were perfect, one ought to pick exactly the same individuals for the three classes (r = 1.00). Even using the same identical photographs, one's second judgment is not identical with one's first. The correlation is, as above stated, about r = .60 to r = .80. As the correlation which I obtained for the Class of '86 was r = .39 approximately, and that for the Class of '87 r = .38 approximately, it would seem that there is a good deal of change in the proportions of the features, but nevertheless there is enough constancy to yield a significant correlation, even after allowing for necessary errors in judgment.

The two squares below show that all figures, from the Harvard tests, fit in about where they should for persons mentally above the level of the "average man" but below the level of the "great man."

ADULTS
AGED ABOUT 47

Students	Large or Long	Average	Small or Short	
Large or Long	10	4	1	15
Average	10	21	6	37
Small or Short		4	4	8
Totals	20	29	11	

Class of 1886
r = .39 approx.

ADULTS
AGED ABOUT 47

Students	Large or Long	Average	Small or Short	Totals
Large or Long	8	6		14
Average	4	31	5	40
Small or Short		2	4	6
Totals	12	39	9	

Class of 1887.
r = .38 approx.

HEREDITY AND PHYSIOGNOMY

All this "counting noses" is not without significance for the science of heredity. Great men, famous men, eminent men, distinguished men, successful men, high average men,—using these terms as a descending series of grades towards mediocrity, are all to a certain extent the product of outward circumstances as well as inward forces predetermined in the germ-cells. It

is usually difficult to prove that any mental or moral peculiarities found in groups of persons selected for study are really due to inherent or germ-cell differences. Most of the alleged evidence on this score is entirely without significance, since it can be turned in one direction as well as another. This is the case even in Galton's famous work "Hereditary Genius," though not in his study of twins. It is the case with Odin's oft quoted work, and with the Jonathan Edwards family, and most of the material contained in the notorious degenerate families, "Jukes," etc. The environmentalists have not been slow in seeing this point.

If, as appears probable, each grade of mental superiority is associated with a little larger facial trait, such as the nose, it is at least difficult to see how favorable home environment, good education, or a good run of luck, could make a man's nose larger.

The growth of the face is like the growth of all parts of the body, controlled to a great extent by internal secretion. We do not know much as yet about the actions of these secretions on growth, but one thing however is quite certain, and that is that no matter how important the glands of internal secretion may be, these glands, in their growth and activity must, *under ordinary conditions*, be themselves determined by heredity. The common facts of every day experience prove it. How else can it be that Chinese look like Chinese and Negroes like Negroes. Not only do the facts of racial resemblance prove that the growth controlling force must be in the chromosomes (since the male can influence it as much as the female) but the common facts of family resemblance prove that smaller facial peculiarities are also highly hereditary, and finally the identity of the facial growths of identical twins caps the climax.[6]

CONCLUSION

So, in conclusion, it seems safe to say that here in the size of the nose is one point where a beginning may be made for a future science of physiognomy. The majority of great men have large or long noses, the remainder nearly always have noses of at least average size. Although many mediocre or inferior people have large or long noses, men of measurable intellectual superiority do (statistically) have noses somewhat larger or longer than the average size. The exception only proves the rule. Only very rarely do we find a great man with a distinctly small or short nose.

Furthermore, each supposedly higher and higher intellectual group is found to be associated with greater and greater nose-measurement.

[6] See JOURNAL OF HEREDITY, "Twin Number," December, 1919.

THE EUGENIC PROSPECT: National and Racial, by C. W. Saleeby. New York, Dodd, Mead & Co., 1921, pp. 239.

One knows what to expect in picking up a new volume by Dr. Saleeby, and this one does not disappoint. It shows the fluency, warm-hearted enthusiasm, the lack of documentation, the emphasis on the ego, and the all-embracing definition of eugenics, that have marked its predecessors. The volume is made up of a number of somewhat disconnected essays, which might have been written for periodical circulation. There is no index. Eugenics, as understood in America, is sometimes conspicuous only by its absence. The smoke nuisance, tuberculosis, dietetics, and health centres receive the chief emphasis. One of the most interesting features of the book is the reference to Americans conditions,—an outgrowth of two visits to the United States by Dr. Saleeby in recent years. It is of course gratifying to national vanity to find that he regards us, and our fellow-continentals the Canadians, as years ahead of Great Britain in almost everything that has to do with racial betterment.—P. P.

IMMIGRATION AND THE THREE PER CENT RESTRICTIVE LAW

ROBERT DE C. WARD
Harvard University

THE NEW LAW AND ITS ENACTMENT

THE new 3% immigration restriction act was designed to meet post-war conditions which our previous laws were never intended to cope with. It passed both Houses of Congress by tremendous majorities, and, after being "pocket-vetoed" by President Wilson, was again passed by similarly large majorities and promptly approved by President Harding. The backbone of the new law is as follows (Sec. 2):—"That the number of aliens of any nationality who may be admitted under the immigration laws to the United States in any fiscal year shall be limited to 3 per centum of the number of foreign-born persons of such nationality resident in the United States as determined by the United States census of 1910." Eight classes of aliens are excepted from this provision, including "(8) aliens under the age of eighteen who are children of citizens of the United States." Provision is made for the determination of the exact numbers of aliens of the different nationalities who may be admitted. The number of any nationality that may be admitted in any one month shall not exceed 20% of the total number of aliens of such nationality who are admissible in that fiscal year. Preference shall be given, "so far as possible," to wives, parents, brothers, sisters, children under 18 years of age and fiancees of citizens, of those who have applied for citizenship, and of persons eligible for citizenship who were in the service of the United States during the war, and were honorably discharged. Provision is further made for the preparation of rules and regulations necessary to carry the Act into effect, and for the publication of statements showing the exact numbers who may be admitted. The Act continues in force until June 30, 1922.

THE REASONS FOR THE NEW LAW

The enormous majorities by which Congress passed this bill clearly reflected the firm conviction of the great mass of our people that immediate and effective restriction was imperative. There has never been a time in the history of immigration legislation when the popular demand was so widespread and so vehement. The practically unanimous opinion of Government immigration officials and of all unprejudiced experts was that immigration was certain to increase, and increase rapidly, to numbers greatly exceeding those of pre-war days, and that the quality of the bulk of the newcomers would be distinctly inferior. Very important testimony along these lines was received from United States consular officers at numerous foreign ports and submitted by the Department of State to Congress. These reports, coming from many different men, and many different places, are distinctly to be regarded as unprejudiced and authoritative. They practically all agree in certifying that the majority of the prospective immigrants are both physically and mentally undesirable. Such expressions as "physically deficient," "mentally deficient"; "economically undesirable"; "socially undesirable"; "of low standards of living," "not of the most desirable class," occur again and again. Furthermore, numerous competent and unprejudiced observers who had been making a first-hand study of the conditions in Europe fully concurred in the views expressed by our own consular officers.

The predictions made by these various competent authorities have been fully verified. Immigration during the year ending June 30, 1921, exceeded 800,000, almost doubling that of the preceding year. Furthermore, the opinion of those who have had opportunity to observe the new arrivals, and who are unprejudiced and honest in their views, is to the effect that our consular officers and our experts were fully justified in their statements regarding the inferior quality of most—not all—of these people. An immigration official at New York has recently reported that the majority of the aliens now coming in expect to be fruit peddlers, shoe-blacks, soft drink venders and sweat-shop workers (N. Y. Times, Sept. 12, 1921).

THE OPPOSITION TO RESTRICTION

In spite of the extraordinary popular demand for restriction in accordance with which Congress acted, there was insidious, active opposition; thoroughly organized; heavily financed; issuing misleading information; playing upon all sorts of alien prejudices; endeavoring by every possible means to counteract the plain will of the vast majority of the American people. One of the best known and most reliable Washington newspaper correspondents, Mr. Mark Sullivan, writing of the hearings before the House Committee on Immigration (Feb. 7, 1921) said:

> The great bulk of the hearings consisted of testimony from special interests, either racial or business, who opposed the bill strenuously. No thoughtful American, equipped with knowledge of the background, can read the stenographic report of those hearings without being deeply and sombrely concerned.

Still more striking is the evidence brought forward by Hon. John C. Box, of Texas, in the House of Representatives Jan. 8, 1921. Judge Box said:

> Mr. Chairman, recently by a vote of 295 to 41 a bill suspending immigration was passed by this House, in which vote the will of the American people spoke, and party lines disappeared. But powerful influences oppose restriction. Two of these are:
>
> First. A demand by the foreign born among us that their kins-people and racial comrades be admitted freely.
>
> Second. Individual and corporate greed which disregards the present and future welfare of the mass of Americans and their children, because it wants money and power over labor.
>
> The Inter-Racial Council is a mouthpiece of the opposition of these two groups. To it I invite your attention. . . .
>
> The Inter-Racial Council is a concern of some magnitude. Some months ago it had 40 or 50 executives and other full-time paid employees in its offices in New York, and an unascertained number of other agents and employees. It is financed, in part at least, by its industrial or subscribing members, numbering several hundred. The following are some of its subscribing members, whose names I get from its printed literature and from the testimony of Mr. Mayper, its executive secretary:
>
> Phelps Bros. & Co., "owners of an Italian steamship line," the International Mercantile Marine Co., Barber Steamship Lines, Cosmopolitan Shipping Co., Downey Shipbuilding Corporation, France and Canada Steamship Co., Green Star Steamship Co., Pacat Steamship Co., Pacific Steamship Co., Todd Ship Yards Corporation, Standard Oil Co. of New Jersey, Allegheny Steel Co., American Beet Sugar Co., American Locomotive Co., American Woolen Co., Armour & Co., Atlas Powder Co., Chattanooga Coke & Gas Co., Colt's Patent Firearms Manufacturing Co., General Electric Co., Henderson Shipbuilding Co., Hillman Coal & Coke Co., Indiana Pipe Line Co., Inland Steel Co., Kelley-Springfield Tire Co., Lackawanna Steel Co., National Sugar Refining Co., National Ship-

ping Co., New Home Sewing Machine Co., Oliver Iron & Steel Co., Pennsylvania Coal Co., Pennsylvania Coal & Coke Corporation, Pennsylvania Textile Co., Phelps-Dodge Corporation, Southern Cotton Oil Co., Standard Steel Car Co., Studebaker Corporation, Underwood Typewriter Co., Worthington Pump & Machinery Co., Bethlehem Steel Co., Cudahy Packing Co., Dold Packing Co., Du Pont de Nemours & Co., General Motors Co., Libby Mc Neil & Libby, Swift & Co.

These are only a few of the several hundred big financial, industrial and steamship concerns whose money is financing the propaganda of the Inter-Racial Council. It will be noted that many steamship companies are among them. One list of these subscribing or industrial members will be found in the committee hearings of April 22, 1920; another list, containing some names not given in the testimony, will be found printed on the literature of the Inter-Racial Council.

These subscribing members pay annual membership fees amounting to as much as $2,500 for some concerns, and more than that for a few, and smaller sums for each of many others. "It runs from $100 a year to $2500, as an average. A few are larger." (Testimony of Mayper, executive secretary, p. 167.)

The expenditures of the Inter-Racial Council in certain of its activities, which manifestly do not cover all of them, amounted to $213,955.19 for the period beginning March 1, 1919, and ending March 31, 1920. (See testimony, Mayper, p. 167) That was the first year of its existence. Its activities have continued with apparently increased magnitude, but I am without information as to later expenditures.

Mr. Blanton. Mr. Chairman, will the gentleman yield?

Mr. Box. Yes.

Mr. Blanton. Is it any wonder, then that this splendid piece of legislation has been sidetracked and held up?

Mr. Box. It is not any wonder, but it is an ominous thing if the will of the American people is to have to give way to influences like these. Nothing but a sense of duty prompts me to present these facts as they have been disclosed. The statement that I have made is based upon testimony. I have the hearings.

The situation is perfectly clear. Further comment on this point is unnecessary.

THE WORKING OF THE LAW

It was natural that there would be certain difficulties in the early working of the new law, before the exact numbers of admissible aliens from each country could be officially determined. Numerous steamers arrived during the early part of June with aliens far in excess of the numbers which were admissible. Congestion resulted. To each port there had been assigned a percentage based on the usual percentage entering that port. When these numbers had been filled, efforts were made to borrow, from other ports, "rights" to land additional immigrants. There was great confusion. Immigration officials in Washington went to the limit in showing humanity and consideration. Aliens in excess of the June quota were allowed to land under bonds. By Joint Resolution Congress later provided that the excess numbers of any nationality thus admitted should be deducted from the totals of that nationality admissible during the fiscal year beginning July 1, 1921.

But even in the early days of the new law, and all the more since then, the complications and the hardships to incoming aliens have been chiefly due to the disregard of the law by the steamship companies. In the whole history of our immigration legislation, these companies, with rare exceptions, and then usually only when infractions of the law meant payment of fines, have never tried to obey our laws. Their tactics under the new percentage limitation Act have been as usual.

The percentage bill was before Congress, in one form or another, during most of last winter. There never was any doubt that it would become law before summer. Although the exact number of aliens of each nationality could not be officially determined at the moment of the enactment of the measure, the steamship companies had ample time to make plans to meet the new conditions. They were in no sense "caught," as one editor has expressed it. The logical, and the humane, policy on their part would have been to refuse passage to all aliens who might, when the exact percentages of admissible immigrants were announced, be refused permission to land. But these companies accepted as steerage passengers several thousands of aliens who would, beyond a doubt, be excludable. There is little doubt that these excess aliens were shipped with the conviction that the sympathies of "sentimentalists" and of certain Congressmen who are interested in the "foreign vote" would be so aroused that some special provision would be made for the landing of the excess numbers. The steamship companies deserve absolutely no sympathy. They accepted the passage money of thousands of aliens who should never have been allowed to embark. They have no interest in their steerage passengers beyond the receipt of their passage money. The Commissioner-General of Immigration said in Washington on June 10 last that there were then more than 10,000 immigrants in excess of the June quota already on their way to the United States, and *all were accepted for passage after the new law had gone into effect!*

The monthly "immigrant Derby," when, during the last few minutes of each month, incoming steamships race from beyond the three-mile limit to quarantine in the effort to land their steerage passengers in time to have them come within the quota, and the numerous cases of hardship when the excess aliens have to be debarred, could be avoided if all the steamship companies were honestly endeavoring to live up to the law. The trans-Atlantic steamship lines have a system of daily exchange of information as to the numbers of alien passengers who are embarking on their several ships. No excess over the allotted quota need therefore be started on the voyage.

Although practically all of the difficulties, and the hardships to debarred aliens, were due to the flagrant disregard of the law on the part of the steamship companies, the Administration very properly felt that everything possible should be done to save needless suffering of perfectly innocent aliens. Hence, about mid-September, the State Department sent instructions to American consular officers abroad not to visé passports from any country whose annual admission quota to the United States is approaching exhaustion, or has already been exhausted. This should do a great deal to reduce the number of cases of hardship and of disappointment for which, be it reiterated, the steamship companies, not the laws, are chiefly responsible.

PROPAGANDA AGAINST THE NEW LAW

Even before the new law went into effect, a very active press campaign against it was begun. The law has been subjected to an organized attack by "interested" individuals, alien racial groups and hyphenated societies, and certain influential newspapers. All of these are bent on making any percentage limitation scheme appear unreasonable, unjust and inhumane. All of them are, fundamently, opposed to any action on the part of the American Government to protect our country against practically unrestricted and unselected immigration. In the case of influential newspapers which are incessantly attacking the new law it may incidently be noted that they all carry heavy steamship advertising. In the case of other papers also, the motive is plainly that of the pocket-book. Thus, the Bulletin of the Associated General Contractors has said that the effect of the law will be to "prevent the immigration to this country of the most useful class of immigrants—the com-

mon labors who come here to work in the construction industry." The "influences" against restriction have also been very busy in Washington, interviewing Senators and Congressmen, attacking not only the percentage limitation measure but also all restrictive legislation.

The propaganda against the new restriction law has not been confined to this country. In a despatch to the Philadelphia *Public Ledger*, dated London, Oct. 26, 1921, the following statements were made:

> European steamship companies, the traditional enemies of United States immigration restrictions, have started propaganda aiming at the breaking down of the barriers put up by the "3 per cent" law. They hope when the present temporary measure expires, next June, to have so prepared the ground that again they will be in a position to fill the holds of their ships with Europe's surplus humanity and pour it into the United States. This law which limits the number of immigrants to a very small proportion of the number allowed to enter the United States heretofore was a severe blow to the steamship lines, and they fought it hard when it was before Congress. In the days before the war steamships carried thousands of immigrants at approximately $100 a head, whereas now they carry dozens. The loss of that revenue came at a time when the transatlantic passenger business was less remunerative than for years because of the high costs of operating ships.
>
> To get back some of this business the big companies have outlined a plan for a campaign of propaganda, and already have got it working in England. The plans rest on the idea of digging up specific cases of alleged improper treatment of foreigners at Ellis Island and spreading them broadcast in the European press.
>
> The attitude of the steamship companies and of the other influences which are seeking to bring the new law into disrepute has been clearly set forth by Government officials. Representative Isaac Siegel, of New York, wrote to the President in September citing instances of cruelty to aliens which had occurred in the enforcement of the law. President Harding replied as follows: "I haven't any doubt in the world but the enforcement of the immigration laws is working many a hardship. My own distress has been very great over some of the specific instances which have been reported to me. If I have the situation correctly presented, the difficulty must be charged to the dishonest steamship agents who have brought to this country innocent immigrants in spite of our continued warnings during a period of very great leniency. I know how very persistent have been the impositions which have been made on the Government agents who have been disposed to be sympathetic and more than generous in carrying out the law." . . .
>
> Secretary of Labor Davis reiterated the statement by the President that much of the trouble is caused by dishonest steamship agents and that pitiful stories of hardship are being circulated in the deliberate attempt to discredit the law. Assistant Secretary of Labor Henning on Sept. 3, said,
>
> > Unfortunately the law has no teeth, and the only way the offending companies can be punished is to compel them to take back aliens who are not admissible.
>
> That, he added, was being done, the Department "having exhausted its milk of human kindness." Mr. Henning here emphasizes the fundamental deficiency in the law. *It has no teeth.* There is no fine or punishment for the companies which disregard its provisions, nor is the company required to refund the deported alien's passage money. The only way is to compel the companies to carry back, at their own expense, the surplus, and when this has been done in a few hundreds of cases, it is perhaps not too much to hope that these companies will begin to cooperate among themselves. As soon as they do so, the law will prove entirely workable.

Finally, on Sept. 15, Assistant Secretary Henning added,

> Those in control of the flood of aliens coming into this country deliberately exceed the monthly quotas, and depend upon compelling us, with their sob stories and tales of families being separated, to permit the law to be disregarded.

Patriotic Americans, in whose hearts Patriotism is above Pocket-Book, cannot give too much praise to President Harding, Secretary Davis, Assistant Secretary Henning and Commissioner-General Husband, for their firm stand on this whole question of the enforcement of the law. In the face of aggressive, persistent and thoroughly organized opposition on the part of selfish interests, they have held their ground, tempering the enforcement of the immigration laws of the United States with the utmost possible justice and humanity. They deserve well of their country, and they may be assured of the support and high commendation of the vast majority of plain Americans, who are not organized to work for the enforcement of these laws, and who seldom take it upon themselves to make their views known to Government officials, either personally or by writing. The highest commendation is also due to the Senators and Representatives who, in the face of fierce and bitter opposition, heavily financed and thoroughly organized, secured the passage through Congress of the new Act. To Senator Dillingham of Vermont and his supporters in the Senate, and to Congressman Albert Johnson of Washington, Chairman of the House Committee on Immigration and his staunch supporters on his Committee and in the House, the country owes a great debt of gratitude which it will not forget.

THE NEW LAW VINDICATED

The percentage law, in spite of its crudities and of difficulties in its enforcement, has been abundantly vindicated. Immigration was fast assuming its pre-war rate when the new law went into effect. Although it did not begin to function until early in June, the Commissioner-General estimated that it probably reduced immigration in that one month by about 50,000. As one of the Washington correspondents puts it,

> Incidentally, the sudden appearance of unemployment in America illustrates the wisdom of the act restricting immigration, which was passed during the first few weeks of Harding's administration. Otherwise, our unemployment problem might have been greatly increased. Throughout the world great numbers of human beings have been displaced by war and post-war conditions. These derelicts float towards us as inevitably as water flows down hill. There was some degree of truth, although more mere cleverness, in the saying that America was becoming the "cesspool" of the human race. . . . The new law puts a limit, even if only a loose and partial limit, on the number of immigrants who can increase and complicate our unemployment problem.

SUGGESTIONS FOR FUTURE LEGISLATION

The 3% Limitation Act expires on June 30, 1922. What shall take its place? The "emergency" which led to its adoption still exists, and will continue to exist. There is no longer an "emergency." We are facing a permanent condition of rapidly increasing and of steadily deteriorating immigration. And there are millions of prospective immigrants overseas who are simply waiting for the 30th of June, when they will rush in, in a seething, chaotic mob, unless Congress takes steps to stop them.

A calm, unprejudiced survey of past legislation, and of the workings of the temporary 3% restrictive law, leads the writer to the following conclusions regarding the lines along which our new legislation should be planned.

First: The percentage limitation principle, long and strongly advocated by leading authorities, should be made permanent. Whether this should be the present 3%, based simply on the

number of aliens of each nationality in this country, or a somewhat larger percentage, say 5% or 10%, based on the numbers of each nationality who have become citizens, is relatively immaterial. The latter, on the whole, seems the more consistent and more rational plan.

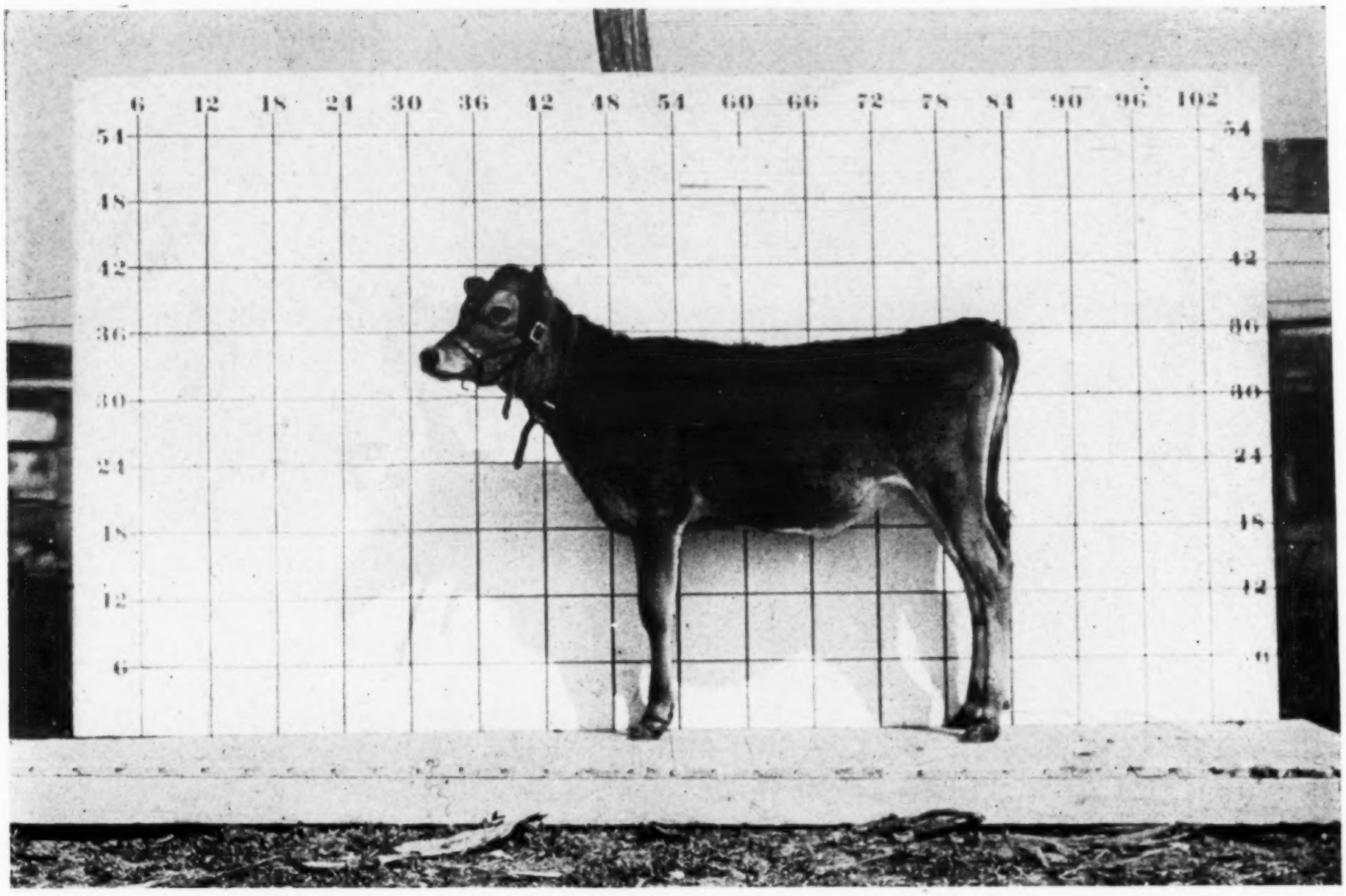
Second: Heavy fines of at least $200 should be imposed upon the transportation companies in the case of every alien who is brought here in excess of the quota, and in violation of the general immigration laws. Such fines would immediately put an end to most of the cases of hardship and suffering which have occurred during the past few months because the present law has "no teeth." It is a very strong argument in favor of heavy fines that, by this means, we can force the steamship companies, without expense to us and with the minimum of hardship to the intending immigrant, to make a careful examination and count of their passengers on the other side, and thus to prevent the embarkation of all aliens in excess of the quotas, and of those who are inadmissible, for any other reason, under our laws.

Third: Every prospective immigrant should have a passport, viséd by an American consul after the alien has been "passed" by an immigration inspector and a medical officer of the U. S. Public Health Service attached, as Vice Consuls, to various consular offices abroad. This provision is embodied in a bill introduced by Hon. Albert Johnson, of Washington, on July 16, 1921 (H.R. 7804). Such foreign inspection would obviously be a wise and humane way of stopping most of the inadmissible aliens before they started on their voyage. This plan would be to the advantage of the prospective immigrant, and it would also be better for the steamship companies, for it would mean that very few rejected aliens would have to be taken back at the companies' expense. Canada has for years eliminated her undesirable immigrants "at the source." Passports would not give the alien the right to land if, after a second examination at our own ports, he were found to be inadmissible. Cases of this sort would, however, be rare. Furthermore, the number of passports issued in each foreign country should not exceed the official percentage quota of that country.

Fourth: Some plan of registration of arriving aliens such as that suggested by Secretary Davis might well be inaugurated. This would not in any way constitute the alien a suspected or an undesirable person, but it would help us in our task of Americanization and of exercising a sort of watchful supervision over our new arrivals.

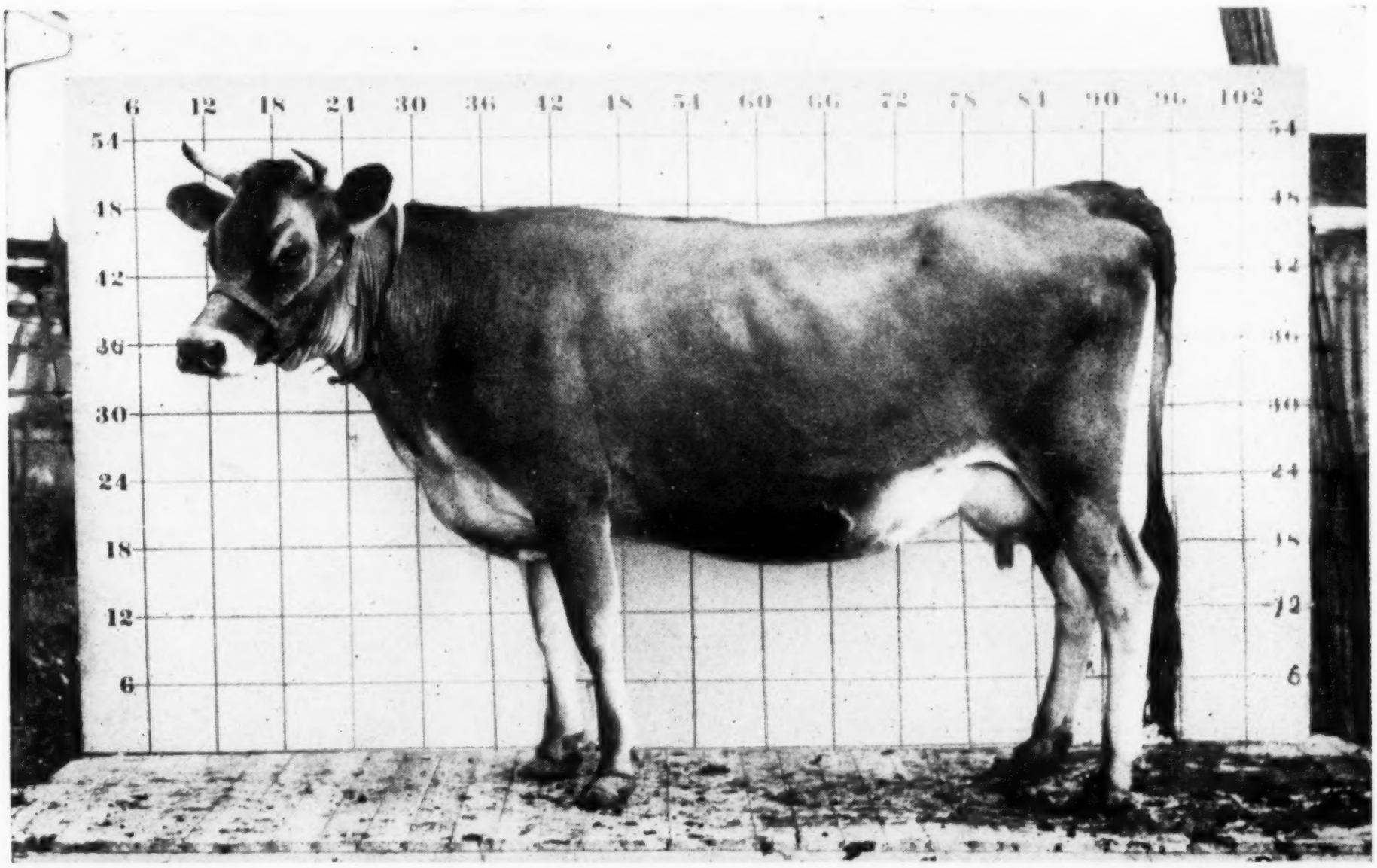
The logical thing to do is to plan our new legislation along existing lines. Experience has shown that these are on the whole wise, sane and reasonable. (Canada, for example, has, in her immigration laws, closely followed our general immigration law, although she has added many additional restrictions.) With the changes and additions above suggested, certain perfectly definite results would follow, viz., (1) a reasonable restriction, to something like an assimilable quantity, of the number of immigrants; (2) a far more careful selection, and a more effective elimination of the unfit; (3) a very great reduction in the number of cases of hardship now arising when aliens reach our shores only to be deported.

In the light of all available facts, it would seem in the highest degree unwise, illogical and dangerous to embark upon any new and untried schemes of immigration legislation, such as those of putting almost unlimited discretionary powers in the hands of a Commission; of repealing any portion of our general immigration Act of 1917, and of superseding the Chinese Exclusion Act and the "Gentlemen's Agreement" with Japan by a plan for admitting Orientals on any percentage basis.



HOW MUCH WILL A CALF GROW FROM CALF-HOOD TO MATURITY?

This is Valentine Betty, a Jersey calf, photographed in May 1917. The picture below shows her as she appeared in May 1921, indicating at a glance the growth that took place during the four years. It will be noted that the growth is very little in length of legs but a great deal in depth of body. (Fig. 11.)



VALENTINE BETTY AS A MATURE COW

Six calves measured in May 1917 averaged 32.8 inches in height. Four years later they averaged 47.9 inches. The growth of 15.1 inches came from a deepening of the body by 11.1 inches and a lengthening of the legs by 4 inches. (Fig. 12.)

GROWTH OF CALVES

J. J. HOOPER
University of Kentucky

HOW much will a Jersey calf grow in length of leg, and in depth of body as it passes from calf-hood to maturity? To secure definite information regarding the growth of calves, I measured six Jersey heifers when they were six months old and again when they had matured into four and a half year old cows. The six heifers varied from two months to seven months of age when I first measured them, but averaged six months old. The last measurement was taken when they were four and one-half years old.

I find that they average 32.8 inches high as calves, and 47.9 inches high as mature cows. They gained 15.1 inches in height. I find that 11.1 inches of the gain in height came from a deepening of body or chest, and 4.0 inches from a lengthening of the legs. From an inspection of the table it will be observed that the calves grew in length of front legs as much as two to five and one-half inches, but it will be observed that their growth in height came principally from deepening of the body.

Also I would call attention to the fact that the heifers were wider through the thurls at five months of age than through the hips, but after they had become mature cows they were wider through (or across) their hips, than across their thurls.

After the calves had been measured notes were made as to what kind of mature cows they would grow into. In checking over the notes after the heifers had matured into four year old cows, these prophecies were found remarkably correct in most instances regarding both the form of udder and of body conformation. But in one instance a nice heifer began to sway in her back at eighteen months of age, and became very swayed as a two-year old. We find that the udder and teat formation is fairly evident at five months of age.

The measurements of cows and calves are as follows:—

Average of 6 Jerseys	Heifers 5 months old, May 1917	Cows 4½ years old, May 1921	Increase inches	Increase per cent
Ht. over withers	32.8	47.9	15.1	46
Ht. to chest	17.8	21.8	4.0	22
Depth of chest	14.9	26.0	11.1	80
Width of chest	7.8	14.1	6.3	81
Width of hips	8.3	18.8	10.5	120
Width of thurls	8.8	16.3	7.5	85
Width of barrel	10.9	26.3	15.4	140

An Old Problem Restated

THE RELATION BETWEEN RELIGION AND SCIENCE: A BIOLOGICAL APPROACH, by Angus Stewart Woodburne. The University of Chicago Press, 1920, pp. 103.

Speaking more precisely, Mr. Woodburne might have called his approach psychological rather than biological. He holds that science and religion have often been thought to be antagonistic, because the latter claimed a supernatural origin; but that as a fact both of these "attitudes" are purely human in genesis, having their foundation alike in the human instincts. Science he considers to be an explanatory attitude, while religion is an evaluatory attitude. On this basis, he thinks there can be no conflict of interests, but rather there must be a co-operation of the two types of attitude, to the end that human life may be made fuller, richer, and more satisfying.—P. P.

THE "PEACH-ALMOND" HYBRID

LEONARD COATES
Morganhill, California

THE so-called "Peach-Almond" has been known in California for 70 years. Prof. E. J. Wickson has endeavored to trace its origin, and found that it was first heard of in the nurseries of W. B. West of Stockton, one of our pioneer nurserymen, in the early fifties. And further research developed the fact that Rivers of England speaks of showing it to Darwin who said it had long ago been described and catalogued in France.

The acompanying illustrations show characteristics of fruit and give evidence of vigor of tree. The leaves and wood resemble a very lusty almond. The fruit, for several months, looks like an immature, growing peach, until the pericarp splits open, revealing the pit, which is more like that of the peach, but smoother. The pulpy pericarp is sweetish and insipid.

My own first acquaintance with the "Peach-Almond" was in 1877, in the

Uafa Valley, where one tree existed in an orchard of mixed fruits. This tree was subsequently grafted over, as being worthless, commercially, but not before I had saved the seed for use in the nursery I was starting. The tree appears, generally in groups of two or more, in many orchards throughout California. This may be through, or as a result of natural hybridization, distributed from the nurseries in mistake for budded trees, or through some careless hand cutting of buds in an orchard row, and taking some from a chance "Peach-Almond" because of its extreme vigor, and, no doubt, before it had time to exhibit itself as in the illustration.

Apart from all this, I have always found it a most excellent stock for peaches, almonds, and most plums, possessing much more vigor than either peach or almond seedlings.

The tree illustrated is three years old top-grafted on almond, growing on a hillside where no irrigation is available.

THE CHERIMOYA TREE ON ITS NATIVE HEATH

In southern Ecuador (Loja province) the cherimoya tree occurs as an indigenous species, sometimes in such abundance as to form small groves. From this region it has spread, through the agency of man, to many other parts of tropical America as well as to Australia, Ceylon, Madeira, and numerous other places in the Old World. The wild trees here shown are growing in a small ravine near the Hacienda La Capilla, fifteen miles south of the town of Loja, at an elevation of about 5,000 feet. The peculiar leaning habit of the tree is characteristic of the cherimoya. (Fig. 15.)

THE NATIVE HOME OF THE CHERIMOYA

WILSON POPENOE
Agricultural Explorer, U. S. Department of Agriculture

"THE pineapple, the mangosteen, and the cherimoya," wrote the botanist Berthold Seemann, "are considered the finest fruits in the world. I have tasted them in those localities in which they are supposed to attain their highest perfection—the pineapple in Guayaquil, the mangosteen in the Indian Archipelago, and the cherimoya on the slopes of the Andes—and if I were called upon to act the part of a Paris I would without hesitation assign the apple to the cherimoya. Its taste, indeed, surpasses that of every other fruit, and Haenke was quite right when he called it the masterpiece of Nature."

This superb fruit (*Annona cherimola*), well known and highly appreciated from Mexico to Chile and Argentina, as well as in a few regions of the Old World, has received, in recent years, the attention of North American horticulturists. The climate of southern Florida has proved too tropical for the production of good fruit (for the tree, though a native of the tropics, grows in those regions only at considerable elevations, where the climate is much cooler than on the seacoast); but in southern California excellent cherimoyas have been grown, and it is likely that in future years fruits produced there will make their appearance in the markets of the eastern United States.

A NATIVE OF ECUADOR AND PERU

The abundance of cherimoya trees in many countries of tropical America has made it somewhat difficult to fix with certainty the native home of the species. The plant often escapes from cultivation and sometimes (as in parts of Mexico and Guatemala) becomes so thoroughly naturalized as to deceive local botanists into considering it indigenous. The principal cause of the uncertainty which has always existed regarding this subject, however, may be sought in the circumstance that the region generally considered by the best authorities as the native home of the species has been visited by very few botanists. Alphonse DeCandolle, in preparing his classical work, the "Origin of Cultivated Plants," was unable for this reason to say more than the following: "I consider it most probable that the species is indigenous in Ecuador, and perhaps also in the neighboring part of Peru." A botanical specimen obtained in Ecuador by the late Edouard André helped him to reach this conclusion. "André gathered," he says, "in a valley in the southwest of Ecuador, specimens which certainly belong to the species as far as it can be asserted without seeing the fruit. He says nothing as to its wild nature, but the care with which he points out in other cases plants cultivated or perhaps escaped from cultivation, leads me to think that he regards these specimens as wild."

More recently, W. E. Safford of the U. S. Department of Agriculture has re-sifted all the available evidence, and has written that "DeCandolle is in all probability correct in attributing it to the mountains of Ecuador and Peru. The common name which it bears even in Mexico is of Quichua origin . . . and terra-cotta vases modeled from cherimoya fruits have been dug up repeatedly from prehistoric graves in Peru."

While working in Ecuador in 1921, I came upon the following passage in Theodor Wolf's excellent work[1] on that country: "In the mountains of Loja Province—for example, between Loja and Malacatos, at an elevation of 1,800 to 2,000 meters—I have seen the cherimoya, in a wild state, forming small groves."

[1] "Ecuador," published at Leipsig in 1892.

WILD CHERIMOYAS FROM THREE DIFFERENT TREES

Three or four centuries of cultivation seem to have produced very few changes in the size and character of the cherimoya. The three fruits here shown were taken from wild trees in the vicinity of the Hacienda La Capilla, south of Loja, Ecuador, and are not different in any important characteristics from the fruits of cultivated trees in Mexico or Guatemala. Variation in size and form of fruit, and in the character of the surface, is common in all cherimoyas, both wild and cultivated. (Fig. 16.)

DIFFICULTIES OF TRAVEL

Having a deep interest in this tree—an interest which extended to the question of its native home—I was stimulated by Wolf's note to undertake a trip into the region mentioned. This involved a month's time and not a few hardships, for southern Ecuador is one of the most remote and inaccessible regions on the Pacific side of South America. It may be entered by one of two routes: from Guayaquil by water to Santa Rosa, and thence across the mountains on muleback; or from Huigra (on the Guayaquil and Quito Railroad) by muleback through Cuenca and Loja. By either route one has an overland journey of five or six days before reaching Loja, the town nearest the region in which the cherimoya is found. I chose the southern route,—that by Santa Rosa. Leaving this village, I rode with the overland mail to an American mine at Portovelo, near Zaruma. This trail is notorious throughout Ecuador, and has been so since Wolf's day (the late eighties). After leaving the coastal plain and beginning the ascent of the first range of the Andes, it is the vilest, save one, which I have ever traveled. During the long rainy season the mule-trains work it into a series of horizontal ridges and intervening ditches filled with water: these are called *camellones*, and are, evidently, the product of that peculiar instinct which leads a mule to step always in the tracks of his predecessor.

Those few American naturalists who have traveled in Ecuador recently will bear me out when I say that Portovelo is the one oasis in a vast desert of muddy roads, poor food, and bad sleeping accommodations. From here I traveled four days more to Loja, being forced to make a long detour because of the bridge across the river at Portovelo having been carried away by high water. Nowhere along this route can one obtain a decent place to sleep, and it is difficult, even, to obtain so much food as a couple of eggs or a few bits of yuca (cassava). The wise traveler will, therefore, leave Portovelo with his saddlebags well stocked.

IN SEARCH OF THE WILD CHERIMOYA

Once in Loja, I made the acquaintance of Enrique Witt, who told me that the cherimoya groves mentioned by Wolf had been largely destroyed in recent years, but that there were in the same general region numerous others, the best of which were perhaps those of La Capilla. I therefore struck off toward the south, soon finding myself in a country as desolate and lonely as any I have ever visited. Far ahead, across the distant mountains, lay Peru, and, much nearer, the valley of the Rio Catamayo. After a short day's ride, I reached the small farm known as La Capilla, swung my hammock between the rafters of the house, begged the loan of the kitchen fire to prepare myself a bowl of pea soup, and prepared to spend the next day among the *chirimoyales*, as the cherimoya thickets are here called. Before reaching this spot, I had seen along the roadside many scattered trees of this species, and a few small clumps of them. I began to feel, therefore, that I was at last to see the cherimoya on its native heath. How, I asked myself, will the fruits of these trees compare with those of our cultivated cherimoyas? This was the question which most interested me. The cultivated cherimoyas have had the benefit of more or less conscious selection extending over a period of at least two centuries. Will there, I continued, be any visible differences between the fruits of these wild trees and those of our cultivated ones?

In a canyon near La Capilla—and later elsewhere in the same general region—I came upon many groves of cherimoyas, growing under conditions which left no doubt in my mind as to the indigenous character of the species. Here we have a district very sparsely peopled, with few routes of travel, in which the cherimoya occurs profusely in nearly all of the *quebradas*, or small canyons. It seems incredible that it should be an escape, for the trees are vastly more numerous than I have ever seen them in Central America, and in addition, they are not limited to the vicinity of roads or trails as in the latter.

In addition to the groves of La Capilla, I have seen cherimoya trees, in great profusion, on the slopes above the Rio de las Playas (farther down stream called the Casanga), between Cangonamá and Catacocha. This region is not far from La Capilla, and like the latter is almost within sight of Peru. Since there is no change in the character of the country, nor, I believe, that of the vegetation at the boundary line between the two republics, I consider it altogether probable that the species occurs in the extreme northern part of Peru; and in this I am supported by the Sres. Carlos and Ramon Eguiguren of Loja, who assure me that they have there seen small groves of wild cherimoyas.

The zone of elevation in which the tree occurs is narrow. Wolf observed it between 5,800 and 6,500 feet; I have seen it as low as 4,700 feet, though not in great profusion, and as high as 6,000 feet. The larger groves seen by me were all at elevations between 5,000 and 6,000 feet.

TREES ABUNDANT IN VALLEYS

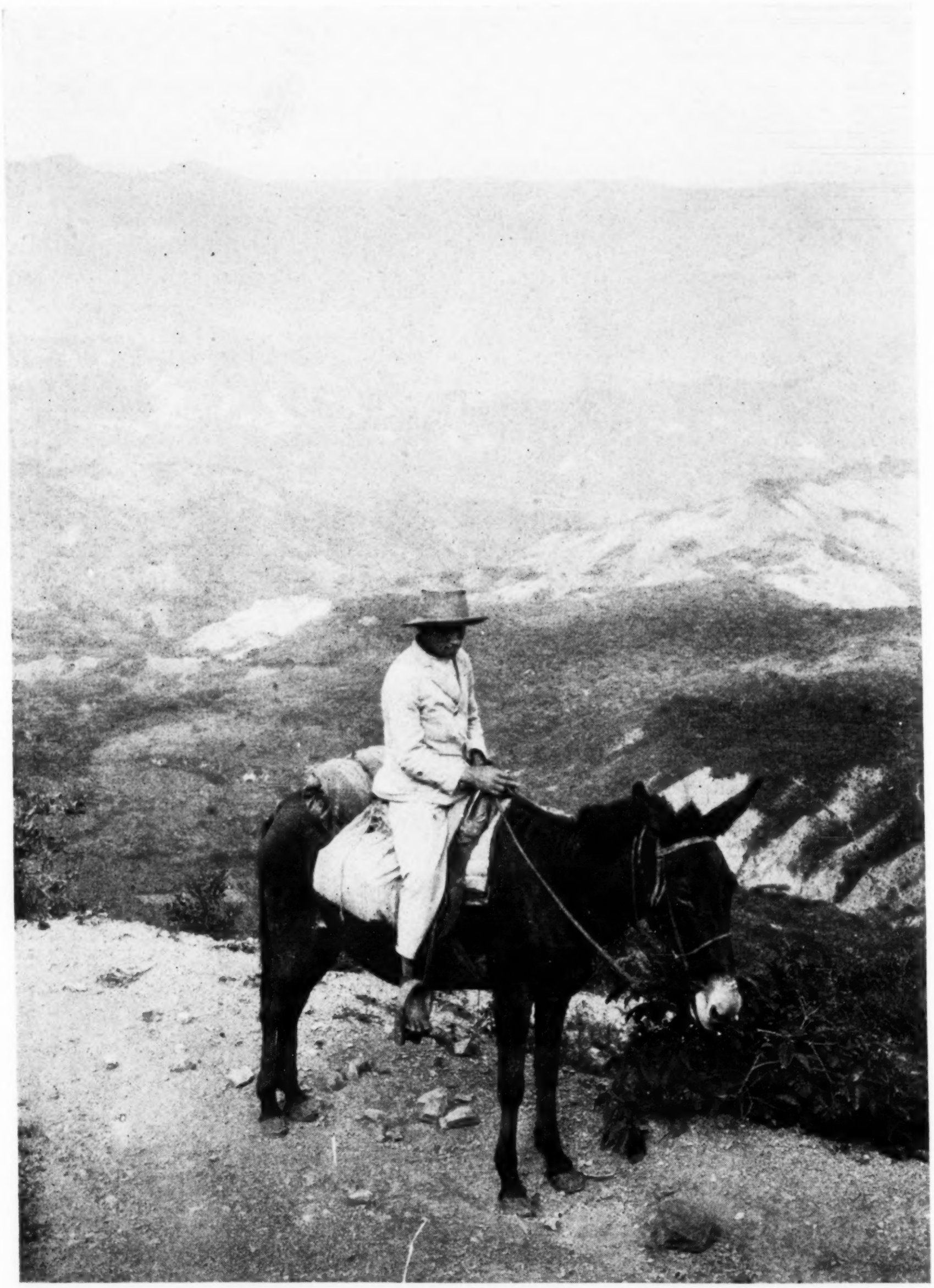
The situations in which the trees are most commonly found, so far as I have observed, are the slopes or sides of small ravines, and the occasional bits of alluvial land which are formed in the narrow mountain valleys. The valley soils seem to be preferred by the cherimoya, and such lands also appear to produce the largest trees; nevertheless it is not rare to find scattered specimens on clay slopes of somewhat rocky character. The climate of this part of Ecuador is warm, as indicated by the elevation, yet it is not hot as it is in the coastal lowlands. Sugar cane is cultivated (though not extensively), and around the occasional huts of the natives there are orange and avocado trees, bananas, and a few food crops such as corn and yuca (*Manihot utilissima*). The climate is less moist than that of Loja. There is a dry season, rather severe I imagine, which extends from May or June to October or November.

Cherimoya trees here reach 25 feet in height, occasionally 30 feet or slightly more. Often they divide at the ground and have three or four main stems. There is a fungous disease which attacks a great many of the trees, forming round black spots on the leaves, at length causing them to turn yellow and fall.

The fruits ripen from October to March, the season being at its height in January and February. It is said that the trees fail to bear when there are no rains in October. Their productiveness is probably not great, even under the most favorable conditions of weather and soil. Experience with cultivated trees would lead us to expect that such would be the case. Because of the immense number of trees in this region, and the very few people present to consume the fruit, cherimoyas are extremely abundant in the months of January and February, and the hogs are said to fatten upon them. The largest and best specimens are sent to Loja for sale; the remainder, with the exception of the few which can be consumed by the people, are either eaten by the hogs or allowed to rot on the ground.

CULTIVATED FRUITS NOT MATERIALLY DIFFERENT FROM WILD ONES

The immature fruits are commonly attacked by an insect whose white larvae, about one-fourth of an inch long, burrow through the flesh and eventually out through the skin, leaving a round hole in the surface. Only a few ripe fruits were available at the time of my visit, but there was an abundance of immature ones. I was interested to see if the various types which we recognize in cultivation, accordingly as the surface is smooth or rough, were to be found upon the wild trees. They were. In the numerous specimens examined, the surface was most commonly smooth, with the carpellary areas marked by raised lines, but there were also, in limited numbers, most of the other types with which we are familiar in California. I did not find the mammillate form. The type



THE VALLEY OF THE RIO MALACATOS

This small valley of southern Ecuador, along with others in the same general region, is the native home of the cherimoya. The valley floor lies at an elevation of about 5,000 feet above the sea; the mountains on either side reach up to 8,000 or 10,000 feet. The climate is dry and moderately warm, the soil mainly clay, with alluvium along the river and in the ravines which lead down from the adjacent slopes. On this alluvial soil, and occasionally on the clay slopes, are many wild cherimoya trees, scattered or in small groves. (Fig. 17.)

in which the carpellary areas are slightly sunken (forma *impressa* of Safford) and the umbonate form with short, thick, rounded protuberances (forma *umbonata*) were both present. At maturity, most of the fruits are small, and many are of irregular form, just as occurs with cultivated cherimoyas. Large fruits are said to be produced occasionally by these wild trees. One which I saw weighed over a pound, and specimens between three and four pounds in weight are said to have been found, though I do not have this on very good authority. In quality, these wild fruits seem to be just as good as the cultivated ones produced in other countries.

It seems, therefore, that the cherimoya has undergone practically no change in cultivation. This is not perhaps so remarkable as it appears at first glance. When we remember that most of the tropical fruits cultivated in America have been propagated only by seed, and that they have been subjected to very little selection—indeed, in most cases they are not even given systematic cultivation—we can scarcely expect that the mere act of transplanting the cherimoya from Ecuador to Mexico or Guatemala would produce notable changes in the character of its fruits.

There are many similar cases in the tropics. The sapote (*Calocarpum mammosum*), a common wild tree in northern Guatemala, is cultivated in numerous countries. I have seen fruits produced in the virgin forests of Guatemala which were practically as good and in no wise different from those of cultivated trees in Cuba and Mexico. The cashew (*Anacardium occidentale*), as produced by wild trees on the Brazilian coast, is fully as large a fruit and not in any way different from the cultivated cashews of many other countries. It may be said, indeed, that the majority of tropical fruits are still wild species, for man has done very little to improve them, except in those cases such as the pineapple and the banana, where the species are propagated by suckers.

TUBERCULOSIS AND HOW TO COMBAT IT, by Francis M. Pottenger, M. D. C. V. Mosby Co., St. Louis. 1921. Pp. 273.

"When Koch discovered the tubercle bacillus in 1882, he supplied the knowledge which exploded the theory of tuberculosis being an inherited disease, and furnished the fundamental facts which proved that it is an infection which takes place after birth."

The author describes the nature of tuberculosis, and gives rules for its treatment which he has found of value during 20 years' experience. It is a book primarily for patients. It is not intended to take the place of a physician, but to supplement his instructions. While many of the rules may already be common knowledge with thoughtful people, the treatise will repay diligent reading, whether or not the reader be a tubercular patient.

On Voluntary Parenthood

CHILDREN BY CHANCE OR BY CHOICE, by William Hawley Smith. Boston, Richard G. Badger, 1920. Pp. 369.

This book is devoted principally to a prolix demonstration of two points: (1) that sex-life in the human species has an "affectional value" as well as a reproductive use; and (2) that it is preferable that children should be born as the result of deliberate planning rather than "by accident." Most persons are probably ready to concede these points without argument; those who are not may find Mr. Smith's discussion of value, in spite of its repetitions and verbosity, although he brings forward no considerations that are not familiar. The argument is not always kept on a sound biological basis, and when it reaches a difficult point the author completely sidesteps. This is perhaps the chief defect of the book, which in general is written in a sensible and wholesome manner.—P. P.